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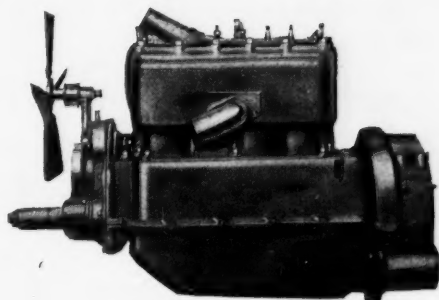
# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

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Number 1

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# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

VOL. XLVII.

NEW YORK—THURSDAY, JULY 6, 1922

No. 1

## What Do Your Dealers Think of Your Car?

Some manufacturers have been trying to find out. One group considers dealers' opinions of value in designing new models. Others disagree. Suggestions from dealers are encouraged by most sales managers. Dealers' views reflect local conditions.

By Norman G. Shidle

**N**EARLY every automobile dealer has a private opinion of the car he is selling. This private opinion is entirely separate from the one expressed in making sales. The two may be similar in character, but are none the less separate.

Will the manufacturer be able to design a car that will sell better if he incorporates in his design many of these private dealer ideas? Is it worth while to question large numbers of dealers, to find out what they think of the car as to body design, axle construction, clutch type, ignition make, etc?

The question is worth serious consideration, because the dealer is undoubtedly in a position to learn certain buyer reactions to the car and to note any special features that seem to create sales resistance. Some manufacturers have considered it worth while to send out rather lengthy questionnaires to dealers asking for their opinions about the design and performance of the car. AUTOMOTIVE INDUSTRIES recently asked a number of prominent sales managers what they thought about this practice.

A majority of them are opposed to the sending out of such a questionnaire, because they feel that the results would not justify the effort. Some members of the group feel more strongly than others that inquiries of this kind are useless, but most of them rec-

ognize the value of receiving dealer communications concerning unsatisfactory features.

One manufacturer sent a questionnaire to dealers asking about a dozen questions, the first of which was:

"If you were to design and build a high quality motor car for your territory, what would be the general specifications?"

1. Motor.
2. Wheelbase.
3. Lubrication.
4. Bodies.
5. Speed range.
6. Gasoline consumption.
7. Price.
8. Other details.

"What features of our present model would you suggest improving?"

The value of a dealer's answers to queries of this sort depends largely upon the interpretation and analysis made by the factory of the answers given. If a large majority of widely scattered dealers are found to agree upon a particular type of lubrication, for example, it may properly be assumed that its use on the car will aid in making sales; that it is favorably thought of by a good many users.



Users' and dealers' opinions are not always in line, however, with the dictates of sound engineering practice nor with the possibilities of practical, economical production. It is the task of the management to correlate the consensus of dealer opinion with manufacturing necessities.

Frequently, moreover, dealer opinion is far from unanimous. One dealer may have a very strong prejudice against a certain design feature, while another may favor it strongly. These different opinions may or may not run along sectional lines.

In such cases, the value of the dealer opinion is not likely to be very great. Some sales managers believe that most of the results of questionnaires are likely to be of this class. One prominent sales executive, for instance, says that:

"As a general proposition such questionnaires or inquiries are valueless from our standpoint, as so many different opinions are reflected in connection with the subject that it is not practicable to take them all under consideration, particularly as many such are influenced by local conditions that do not exist elsewhere.

"Motor manufacturers have always endeavored to work about a compromised point in connection with general design so as to satisfy the general conditions existing in all parts of this country and throughout the world."

Another successful car builder says:

"We are not so sure about the value of such an investigation. Opinion oftentimes is influenced too strongly by what dealers and salesmen feel from competition. We have always adopted the policy of building a car to render a certain type of service."

One company which stands high in the production of middle-priced cars writes the following in regard to its own experience with dealer inquiries along this line:

"We have made verbal inquiries on certain points in the past. Frankly, the net results of the answers we have received were not of very much assistance. I think this is because the average distributor allows his opinion on such matters as this to be influenced too much by his own personal likes and dislikes and also by the local idiosyncrasies of his territory. Consequently the net result of his thinking has little constructive value in solving the manufacturer's problem which is nationwide."

These statements emphasize the strong influence which local conditions are likely to exert in molding the dealer's opinion about the car he is selling. It is true that the dealer does not, and cannot, view the problem of car design from the broad angle necessary for the manufacturer. For that reason his opinion should not be allowed to influence design to too great a degree. The dealer does know the details about local conditions, however, and the summarized opinion of many dealers concerning local user opinions should be of some value in discussing new models and design changes.

This fact is recognized by nearly all sales managers, although some consider it worth more attention than others. One high-priced car maker, for example, says:

"Such information should no doubt be of considerable help because it will reflect the tendency in body designs and mechanics of future production in the automobile industry."

One company thinks so much of its dealers' views that it has practically built its car to coincide with the desires of these men who are to distribute and sell it. The sales manager of this organization says:

"We have never sent out a questionnaire, but when we built up one important model, which we are manufacturing to-day, we called all of our dealers and distributors into the factory and had them go over the car in every respect. . . . We really built the car in accordance with our distributors' request in practically every detail."

This is a most striking example of the distributor influencing design. Many who do not think it wise or worth while to get the dealer's opinion about every item of design, however, are strongly convinced that the dealer can and does offer frequently helpful suggestions and criticisms.

"We often have distributors' meetings," says one car maker, for example, "at which time we invite their expressions as to the type of body they desire, together with any mechanical suggestions that they care to offer that will assist us in attaining as nearly as possible the goal of perfection."

Along this same line is the statement of the sales manager, who says:

"We keep a very careful record of all complaints made by distributors, dealers or owners in our service department. If there is anything fundamental in these complaints, the attention of the engineering department is immediately called to it. In that

way we are enabled to check the service which our cars are giving."

Another sales manager states that:

"We are continually making investigations of this kind and find them very helpful to us in making our plans for future designs and refinements.

"A recent questionnaire sent to our organization revealed the fact that our sales organization is almost 100 per cent satisfied with our product in its present state and could make very few suggestions for changes.

"In addition to questionnaires, this subject is followed up by our mechanical inspectors and in talks with our leading distributors. We believe contact of this kind is very necessary."

Still another, who does not approve of the detailed questionnaire idea, says:

"We do welcome suggestions, however, made by our dealers for the improvement of any part of the car and all suggestions are referred to the engineering department for their information and investigation."

The purpose of the manufacturer in designing a motor car is to build a vehicle from which he can make the most profit. The type vehicle will depend upon manufacturing facilities, character of sales organization, past models, etc. But from the viewpoint of ultimate profits three factors must be considered in every new model:

### Yes and No

**T**HERE is an old story about a rustic who walked along the bank of a stream running through the estate of a rich landowner. He finally came to a sign, prominently displayed on a tree, which read:

"Don't fish here."

He looked at it for a moment and then remarked:

"Some says they do; some says they don't."

\* \* \* \*

This is about the answer given by automobile manufacturers in answer to the question: "Is the dealer's opinion as regards design worth very much?" This article tells what some of the leading sales managers think about this interesting question and discusses their answers from a merchandising and production viewpoint.



1. Engineering practice and possibilities.
2. Production practice and possibilities.
3. Sales reaction; that is, opinion of users who base their opinion chiefly upon factors of appearance, comfort, apparent performance, etc.

The first two of these are fundamental, of course, to permanent progress. The car must be built in accordance with engineering and production necessities or it will not stand the test of time, nor will the manufacturer be able to make a profit.

The third factor, while important, is less definite and subject to a greater degree of variation and change. The laws governing it are not anything like so accurate, scientific and fixed as in the case of the first two.

A company may build a car, for instance, with a radiator shape that seems peculiar and which causes an unfavorable reaction in the minds of most users and still sell that car in increasing quantities through sales effort.

The company may disregard some of the accepted principles of sales effect and still make progress.

It is utterly impossible, however, for a company to build a car whose engine has been designed without regard to correct engineering practice and still be successful. Successful cars must operate.

This relation between the three basic factors probably explains the feeling of manufacturers, that the opinion of the dealer is of limited value in considering design. The dealer's own opinion of the dealer is not useful as regards the engineering and production phases of the problem. But these phases are fundamental. Whatever attempt is made to meet buyer desires must be made within the limits of possibility set by these two phases.

If the dealer expresses a preference for clutch type "A," for instance, and the engineering department of the factory is certain that clutch type "B" is superior, permanent progress in sales will be advanced to a higher degree by using clutch type "B."

**T**HERE are certain features, however, about which the dealer can express an intelligent and constructive opinion. He can indicate the body models most in demand in his territory and can thus aid the factory in adjusting production schedules accordingly. He can tell the effect which price is having on his sales. He can turn in important service "kicks" to the factory. He can suggest many things about the car that have had some effect, favorable or unfavorable, on his sales. And the factory can profit by those suggestions.

If the opinion of the dealer is asked about such things as mechanical equipment and performance, the replies received should be very carefully interpreted. A general dealer prejudice against a particular type axle may not indicate a need for changing the axle, but merely the necessity for "selling" the axle to the dealers on its merit. The engineer is a better judge of that merit than the dealer. But the factory wants the dealer sold on every part of the car.

By interpreting dealer replies carefully and by refraining from accepting them simply at face value, some practical advantage may be gained even from asking dealers questions concerning which their judgment is obviously superficial.

The effect of such questions upon the relation between the dealer and the manufacturer must also be considered. Dealers often feel that they should have more to say about the design and equipment of the cars which they are handling. One big New England dealer, for example, complained bitterly a year or two ago because his factory has suddenly put a "freak" radiator on a new model which, he claimed, reduced his sales 25 per cent. "That change would never have been made," he said, "if the dealers had been consulted beforehand."

**T**HE difficulties of following dealers' suggestions have already been pointed out, but the advantages to be secured from encouraging dealers to make suggestions must not be overlooked. Among these are:

1. Valuable and constructive criticism may be secured.
2. The dealer is made to feel that he is an integral part of the factory organization and that the factory is really trying to meet his selling needs to the best of its ability.
3. The factory learns the "kicks" that are in the dealer's mind and is enabled to explain to him the reason for certain things. Thus, the dealer's confidence and enthusiasm are increased.

There are certain dangers attached, of course, as the dealer will probably look for some ulterior reason behind the questioning. One sales manager expresses this thought very well in the following:

"I am strongly opposed to sending out questionnaires to dealers concerning changes in cars. When such action is taken, the dealer immediately figures that within a comparatively short time some radical change is going to be made and, as a result, business is immediately restricted.

"Furthermore, there is so much difference of opinion among dealers as to designs that, should any change be made, those who were out of line would feel that their recommendations had no weight.

"We frequently receive suggestions or comments. These are carefully tabulated and submitted to the engineering department. We welcome any suggestions of this kind, but do not believe that a detailed questionnaire would be of benefit."

There is little question that manufacturers will profit by encouraging suggestions and added co-operation from their dealers all along the line. The good will between factory and dealer is increased through such relationships. But whenever questions, specific or general, are to be asked of dealers, it should be recognized that an opportunity for promoting co-operation is presented, and effort should be definitely made to achieve that end and avoid possible dangers which may arise.

## What Cornell University Is Doing in Automotive Research

**P**ROF. H. DIEDERICH, head of the Department of Experimental Engineering, Sibley College, Cornell University, writes:

"In this laboratory we have just found it possible to obtain some money to start research work, but we are not very far along. Just at present we are interested in materials of construction and in fuels. Along the former line the laboratory is carrying out some fatigue tests under the direct auspices of the Bureau of Mines, and

we are also investigating the heat treatment of a special alloy die steel. In connection with fuels we are studying the gasoline problem, making first a collaboration of all the available information, which will later be followed up with work particularly devoted to the development of apparatus to determine the completeness of vaporization of gasoline in the manifold. We are also making preparations to study the combustion phenomena in the Diesel engine."

# General Purpose Tractor Needed for American Farm Market

The common type of tractor can be used for 77% of field operations in raising common grains; for 38% in row crops. Extensive market for general purpose machine. Cost of marketing decreased through wider distribution. Large farms constitute small proportion of total. Small farms real tractor market.

By G. B. Gunlogson\*

**T**HERE is submitted herewith a report of an analysis of the power requirements on the farms in this country, with the object of showing the agricultural and economic possibilities of the common type of tractor and calling attention to the great field and opportunity open to a machine of greater range of adaptability.

The tractor has now become so well established that it will always be a factor in agriculture, and the tractor business is assured of permanency. The question before the tractor manufacturer is no longer whether the tractor business will continue or not but rather how extensive a business he should prepare for.

Farm power requirements are so vast that if tractors were to furnish this power or even one-half or one-fourth of it, at a seasonable rate, millions of tractors would be required. However far we may be from complete motorization, these agricultural power requirements determine the possibilities of mechanical power in the farming industry. Thus plowing has become the principal work of tractors because that operation requires more power than any other one operation on the farm. The common type of tractor has therefore been designed especially as a plowing machine, although it is also suitable for some of the other field operations, such as disking, harrowing, seeding and harvesting. While this common type predominates, we have various other types of tractors each designed to meet some particular condition or requirement. It will be the first aim of this report to show the possibilities, or rather the future of these different types of tractors.

We are nearer to complete motorization of farming than is generally supposed. To adapt mechanical power to the varied requirements of farming is not a simple problem, however, or one to be accomplished in haste, but it is no more impossible than have been the transitions in some of the other industries. Practically all the efforts of the tractor manufacturer have been directed toward mechanical improvement and refinement rather than adapting the tractor to the conditions of power farming. In fact, surprisingly little has been done so far along this line. Some of the most successful farms in the country have been operated without a horse for two years more economically and more satisfactorily than they were before. One of the State experimental farms in Arkansas is being completely motorized and will be operated without a horse. Three other states

are contemplating similar moves. The horse has disappeared entirely from the roads in many parts of the country and the truck has taken its place. It is also interesting to note that the production and sale of the garden type tractors are on a stable basis. These disjointed facts are mentioned because they are very significant in the present trend.

There are two problems so fundamental in the practical adaptation of the tractor to farming that no study of tractor possibilities can be made without their careful consideration.

First, the diversity of farm operations—which govern the range of utility of any type of tractor on a farm.

Second, the size of the individual farm unit.

To satisfy, in a fashion, the multitudinous conditions involved, various types of tractors have been offered, which may be classified as follows:

- |                       |  |
|-----------------------|--|
| (1) Common Type       | Which may be wheel or crawler; two or four-wheel drive.  |
| (2) General Purpose   | Machines that may be used, in addition to some of the common field operations for cultivating corn and other row crops by slight changes or the use of convertible elements. |
| (3) Garden Tractors   | Tractors designed to take the place of one or two horses for cultivating and other work in gardens and small truck farms.  |
| (4) Power Cultivators | Designed for cultivating corn and other row crops.   |

The only object in presenting this classification at this time is to effect their association with the analysis which follows that the possibilities of these various types will be considered in connection therewith.

Tractors have been so extensively used under such wide range of conditions that their possibilities with respect to farm results may now be determined with some accuracy. These results, after all, determine the future of the tractor.

Chart No. 1 shows the acreage of the principal field crops grown in this country and their relative areas expressed in percentages. This indicates in a measure the complexity of field operations. It will be noticed that row crops constitute 59 per cent of the acreage of field crops, not including hay.

In this study the hay crop may be grouped with row

\*J. I. Case Threshing Machine Co.



crops since the use of the common type tractor is very limited in connection with either. Then both the row crops and the hay crop constitute about 66 per cent of the total crop acreage in the country.

Under favorable conditions, when not restricted by any economic limitations, the common type of tractor may be used for about 77 per cent of the field operations in raising the common grains and about 38 per cent in row crops.

The principal field crops of the country are corn, wheat, oats, cotton and hay. While these crops, except cotton, are not strictly sectional their relative importance varies according to quite well-defined areas.

Chart No. 2 shows the United States divided into representative crop areas.

The demarkations are based on crop surveys made by various state agricultural colleges and agricultural statistics.

Only a vague idea can be had of farm conditions, crops, field operations and farm requirements without extensive farm management surveys. Unless one possesses very intimate knowledge of farm conditions and practices in the various parts of the country the most misleading conceptions are sometimes gained from farm statistics, especially when applied to anything relating to the farm as a whole or as a unit. Therefore, these charts only furnish a general picture.

Charts Nos. 3, 4 and 5 show typical farms with respect to crop layout in three of the crop sections indicated in the previous charts.

Each chart shows the average farm in each of the crop areas. These charts show better than anything else the very important influence that the diversity of crop and the size of the farm unit, as stated before, have on farm power requirements, and therefore the sale of tractors.

CHART 1

Principal Field Crops in the United States

	Not Cultivated	Cultivated	%
Corn .....	55,000,000	110,000,000	39.4
Wheat .....	42,000,000	.....	19.6
Oats .....	8,500,000	35,000,000	15.0
Cotton .....	8,500,000	.....	15.5
Barley .....	.....	.....	3.0
Peas .....	.....	5,500,000	2.0
Rye .....	5,000,000	.....	1.8
Sorghum grains .....	.....	5,000,000	1.8
Potatoes .....	.....	4,200,000	1.5
Flax .....	1,900,000	.....	0.7
Peanuts .....	.....	2,000,000	0.7
Beans .....	.....	1,000,000	...
Tobacco .....	.....	1,500,000	...
Sugar beets .....	.....	1,000,000	...
Rice .....	1,100,000	.....	...
Buckwheat .....	1,000,000	.....	...
	114,500,000	165,200,000	59%
All field crops .....	279,700,000		
Hay .....	55,500,000		
Total .....	335,200,000		
(5 year average)			

There is a definite relation between the size of the farm and the economic limitations of the tractor. For that reason I have divided the farms of the United States into three classes by sizes (Chart No. 6).

In the foregoing some of the important factors which determine the adaptability and the economy of the farm tractor have been indicated. The tractor has been in use so long and so extensively that its status has now been established, its economic and agricultural possibilities and its relation to general farm conditions more or less clearly indicated. There is no doubt that this has been pretty well accomplished and that the present type of tractor has now found its place. This field, which the common type of tractor can claim is extremely limited, however, when compared with the actual or total power requirements on farms. It is desirable to point out at this time how the sale of tractors has been governed by the conditions set forth and how the future of the tractor is absolutely dependent upon these conditions.

To find out what size of farms our tractors are being used on, over 5000 cards were sent to owners of Case 9-18, 10-18, 10-20 and 15-27 tractors.

Over 2800 cards have been returned from all parts of the country and these have been tabulated.

Less than 20 per cent of these tractors have been sold on farms of less than 175 acres in size. There are approximately 6,300,000 farms of all sizes in the United States of which only 18 per cent are 175 acres or over in size. It is particularly noteworthy that over 80 per cent of our small tractors are going to farms in this small class and less than 20 per cent to the other 82 per cent.

If we were to include the larger sizes of tractors this percentage would again be reduced somewhat, since still fewer of the larger tractors will be found on farms of less than 175 acres.

While the tractor market in this class is quite extensive, there being over 1,000,000 farms included in the classification, it is only 17.9 per cent of the total number of farms in the country.

Referring to Chart 6: Class A includes farms of less than 50 acres. This cannot be considered a market for the common type of tractor, but it should afford an extensive market for a tractor adapted to it.

Class B, with nearly 3,000,000 farms, affords by far the largest possibilities, but less than 20 per cent of our tractors are being sold to farms in this class, because they are not adapted *economically* and *agriculturally* to the average farm in this class.

Hence, it is seen that the business is restricted to comparatively large farms. However extensive this market may be, it is only a small part of the total market, as has been indicated. It is also evident that a power farming dealer handling our product only is not in a position to serve the entire community, and this suggests a problem that in itself is a very important one, although outside of the scope of this report.

The tractor surveys that have been made by the Department of Agriculture and some of the State colleges cor-

THE UNITED STATES DIVIDED INTO TYPICAL CROP SECTIONS

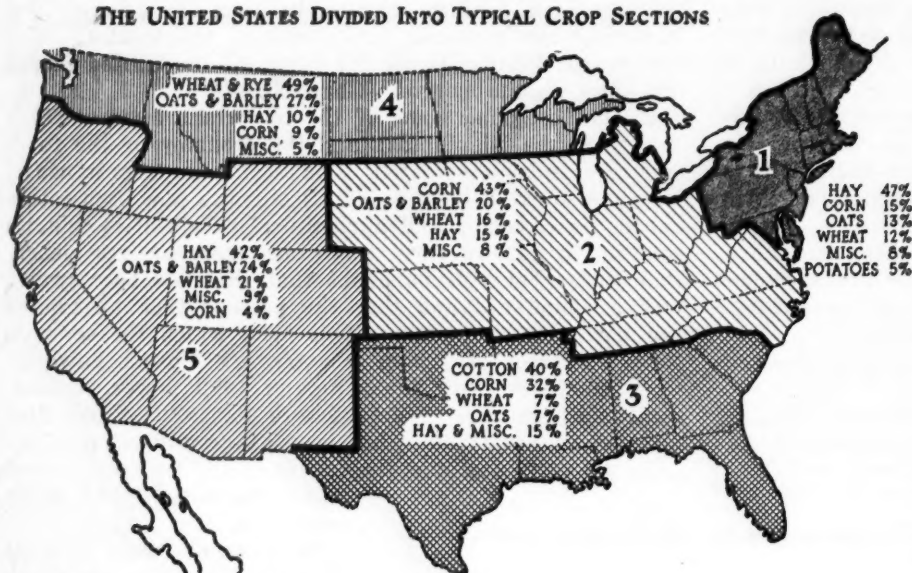


Chart 2

roborate these results, and your attention is called to:

The Kentucky Agricultural Experiment Station. Bulletin No. 222.

The Farm Tractor in the Dakotas. U. S. D. A. Bulletin No. 1035.

Economic Study of the Farm Tractor in the Corn Belt. U. S. D. A. Bulletin No. 719.

Tractor Experiences in Illinois. U. S. D. A. Bulletin No. 965.

The investigations that have been made by some of the State colleges and the results obtained make it worth while to consider further some of the facts revealed with respect to the tractor business.

The outstanding feature in every case is the distribution of tractors with respect to size of farms and the comparatively small number of tractors found on the medium size farms.

There is also quite a definite relation between the price of the tractor and its occurrence on small farms. Thus the percentage of Fordson tractors on small farms is considerably higher than in the case just cited.

It is illuminating to define further the agricultural and economical limitations of the common type of tractor by showing the actual power operations required and generally employed in growing and preparing for market our principal grains.

It is evident that tractors will not continue to be sold on farms where they cannot be economically employed.

corn, besides some little other row crops.

To cultivate 50 acres of corn as it must be and is cultivated requires 500 horse-hours of labor during the season. This one operation is almost equivalent in amount of power used to all the plowing on this same farm.

Furthermore, cultivating corn is a seasonal job that must be performed within a definite period every year. To do this one operation properly on this 160-acre farm requires at least **four horses**. In fact, the average acreage of corn cultivated per horse in this section is only around 10 acres.

#### CHART 7

##### Labor Requirements

##### Per Acre of Crops

##### Horse Hours

Wheat	30 hrs.
Oats	29 hrs.
Barley	30 hrs.
Corn, husked	54 hrs.
Corn, silage	58 hrs.
Wild hay	15 hrs.

(Average from Minnesota Bulletin 157.)

Similar records obtained from other parts of the country, for the same grains, are almost identical.

But the 160-acre farm in question is essentially a 5-to 6-horse farm. In eastern Nebraska the average number of horses on 160-acre farms is 5. In a few other sections, such as in parts of Illinois and Ohio, the aver-

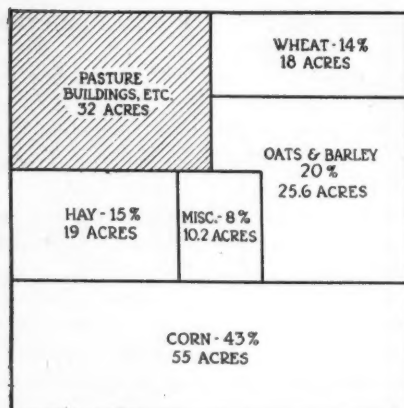


Chart 3—Typical farm crop layout in crop section 2

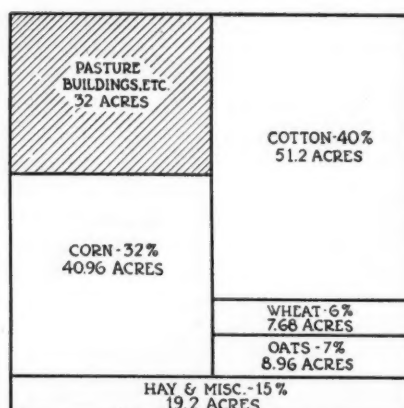


Chart 4—Crop layout in section 3

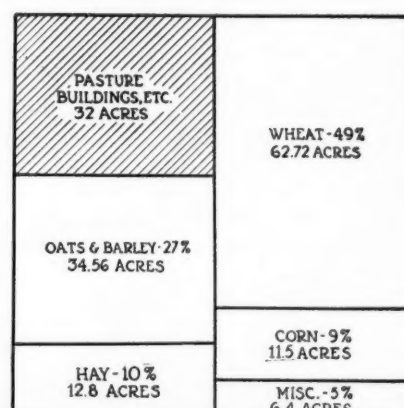


Chart 5—Typical crop layout in crop section 4



age number of work horses on a 160-acre farm is 6.

Since 4 to 6 horses are required to care properly for the corn crop on operations which can not be done with the common type of tractor and since the whole farm can be operated with five or six horses, the investment in a tractor is not justifiable on the basis of economy. For this reason very few tractors of the common type have found their way to farms of this size and their use on such farms will always be restricted.

### CHART 8

#### Power Required for Principal Field Operations in Horse-Hour Units

Operation	Horse Hours per Acre One Operation	Average Number of Operations Required	Power Required for Finished Operation Per Acre
Plowing .....	10.00	1	10 Horse Hours
Harrowing (spike tooth) ..	1.25	2	2.50 " "
Disking (single disk) ....	2.50	2	5.00 " "
(corn 4)			
Packing (roller) .....	1.5	1	1.50 " "
Seeding (drill) .....	2.25	1	2.00 " "
Planting corn .....	1.2	1	1.2 " "
Cultivating corn .....	2.5	3.7	9.25 " "
Harvesting (binder) ....	2.75	1	2.75 " "
Harvesting corn (binder) ..	4.00	1	4.00 " "
Mowing hay .....	2.2	1	2.00 " "
Raking hay .....	.8	1	.8 " "

Hauling the crop in the field, hauling manure and such operations as vary a great deal are not included.

Belt work constitutes about 14% of the power used in raising and preparing for market all the grains raised upon the average farm.

Nothing has been said about the initial investment in the tractor. It is too often assumed that the farmer has sufficient capital to provide himself with efficient equipment. This is far from being so and because the average farmer is often unable to borrow sufficient money the farm is not as well equipped with necessary tools as it should be. It may be of interest to note that the average 160-acre farmer in the State of Nebraska has less than \$1400 invested in all his machinery and work horses. It is not surprising then that he considers seriously the probable effects and results of every investment he makes in equipment. The farmer is not so much interested in efficiency in certain field operations as he is in the economical operation of the farm as a whole. For instance, on the 160-acre farm described before, there are about 40 acres seeded annually to small grain. This operation is accomplished with a 16 or 20 shoe drill and requires 2 to 3 days. Even if power was available without cost on this farm, it would not pay the farmer to buy an additional grain drill to expedite his seeding. He may have 50 acres to double harrow at a certain period. With a four-horse drag this operation is performed in about 2½ days and again it would not pay to buy additional harrows in order to utilize more power and hasten the operation. The same is true of the other operations on the medium and small farm. Thus it is seen that a sensible balance must be maintained between efficiency and economy in farm operations.

It is true that it is often practical to combine certain implements when a large power unit is used, but this is only for certain operations and at certain seasons. On the average 160-acre diversified farm there is little field work that can be performed in this manner. For instance, there may be no need of surface tillage at the time of seeding. Likewise in fall disking there may be no need of dragging the field, etc.

The operations on the average farm are so many and so diversified that the farmer cannot afford to use the most efficient equipment for each operation. His equip-

ment as well as his power unit must be properly balanced. An interesting study along this line is afforded by some data collected by the Department of Agriculture about two years ago showing the number of horses used in a unit for plowing in the various parts of the

CLASS A  
50 ACRES & LESS 35% - 2,253,942

CLASS B  
50-175 ACRES 47% - 2,951,355

CLASS C  
175 ACRES & OVER 18% - 1,153,603  
TOTAL - 6,361,502

Chart 6—Tractor market classified by farm sizes

country. Chart 9 is reproduced from the 1919 agricultural year book. It is interesting to note that about three-fifths of all the land plowed in the country is still done with three horses or less to a plow and only a very small percentage is done with five horses.

### Conclusion

The above will serve to indicate the very wide gap in our line of power farming equipment when considered in the light of actual and general farm requirements.

As manufacturers of power farming equipment we should not overlook the opportunity in the manufacture and sale of a small **general purpose** tractor. While the business has increased rapidly and been controlled by the rate of production rather than the market, it is also evident that the cost of selling is determined largely by the extent of the market for a product, that is, a product possessing a general appeal or serving a universal need can be marketed at a less cost than one of restricted application or appeal, although there may be the same need for both in their respective fields. Any one who has had experience selling our product appreciates that fact.

There are, of course, several makes of machines on the market designed to serve as general purpose machines, such as the Moline Universal Tractor. Many of these, however, have some serious shortcomings or drawbacks either mechanically or from an agricultural standpoint.

Then there are many motor cultivators on the market which are usually not practical for other purposes than cultivating corn or row crops. These have not been sold extensively and never can be. To afford a strictly motor cultivator a farmer must have, at least, 150 acres of corn, which would mean a farm of over 400 acres and there are very few of these even in the corn belt. Charts 7 and 8 will at once indicate the impossibility of such a machine on the average farm.

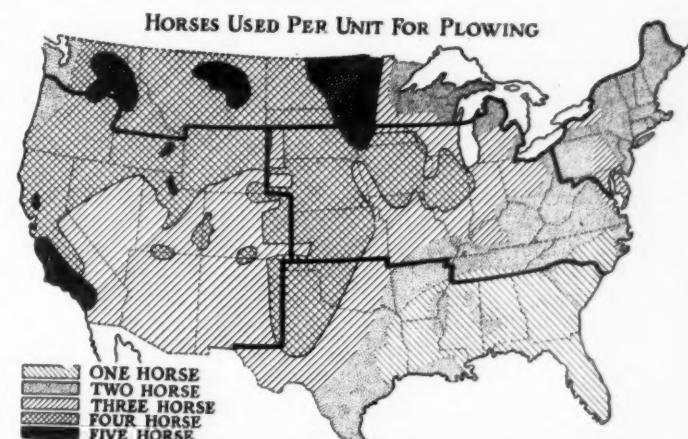


Chart 9

# Marked Increase in Use of Chains for Front End Drives

Stock engines thus equipped, hence this drive appears on assembled as well as manufactured cars. Decision to use this system on new Star car shows wide range of adaptability. New and original drive layouts and improvements permit easy adjustment.

By J. Edward Schipper

**A**UTOMOBILE engine designers have been very much interested in the marked increase in the use of chains for front end drives. In the Engineering Number of AUTOMOTIVE INDUSTRIES a year ago, in an article on "Problems of the Front End Drive in Automobiles," it was pointed out that there was considerable drift toward the use of chain drive. At that time, out of 125 models considered, 81 per cent had helical gear front end drives, 16 per cent chain, 2 per cent spur and 1 per cent other drives. To-day the percentage of chain drives has crept up to 24; that is, nearly a quarter of all models are using this drive.

New recruits to the chain drive advocates include such prominent concerns as Hudson, Haynes, Jordan and Rickenbacker. It has been decided to use this type of drive for the new Star car, which will be put out by Durant and whose engine will be built by Continental Motors.

It was pointed out in the Engineering Number of AUTOMOTIVE INDUSTRIES of June 16, 1921, that 33-1/3 per cent of the manufacturers who make their own engines use chain drive. This year this percentage has increased to about 37. It was also stated at that time that no assembled cars were using the chain front end drive, because no stock engines had such a drive. However, several cars equipped with Continental engines are now using chain front end drive. The new Duesenberg stock engine has a chain front end drive, as has also the Weidely. In addition to these, a number of the stock engines are now being made with the timing gear so arranged that it may be adapted either to chain or helical gear drive.

With the decided drift toward the use of chain drive, there is considerable interest as to what improvements have been made in order to popularize this drive. Probably the most potent factor in this connection is improvement in the manufacturing methods used in making the chain, which has resulted in turning out a superior product

at a considerably decreased cost. The fact that this type of drive has been selected for the engine of the Star car which latter is listed around the \$350 mark, and is also employed in cars of the Lincoln class, indicates a wide range of adaptability. In the manufacture of accurate chains in large quantities use is made of some of the most highly specialized machinery in the manufacturing world. At the plant of the Link-Belt Co., Indianapolis, a machine

has recently been perfected which practically feeds the link pieces in at one end and issues finished chain at the other.

Some of the new installations are very interesting, because they show the precautions which have been taken to eliminate trouble due to the chain jumping the teeth and causing mis-timing, and also because of the ease with which slack in the chain due to wear or stretch can be taken up.

The Morse chain installations on the Rickenbacker, Oakland, Jordan and the Continental 6Y engine show interesting variations of the triangular layout which is favored by Morse. It will be noted that in all of these

drives the chain has at least a 90-deg. contact on every sprocket. The Weidely Motor Co. has adopted the Link-Belt chain with 1/2-in. pitch. This chain drive layout employs the automatic take-up which was described in AUTOMOTIVE INDUSTRIES for Oct. 20, 1921, page 774. The use of this automatic tension governor involves the employment of the double sided chain in which some of the links are reversed, to provide a bearing surface on both sides. As will be noted from the drawing herewith, the use of the automatic idler affords increased bearing contact on the adjacent sprocket.

A very interesting and novel type of layout is the two-step chain front end drive which has been worked out by the Link-Belt Co. for the Holmes Automobile Co. This comprises two eccentric idlers for taking up wear or stretch, both bearing against the reverse side of the chain. The

**D**URING the past year the use of chain drive has increased from 16 to 24 per cent; that is, nearly one-quarter of all models produced employ this type of drive.

\* \* \*

Chain drive has been popular on high priced cars for many years. Its use on lower priced cars is increasing, and this fact is of importance in considering the trend in the use of this drive.

\* \* \*

Improvement in manufacturing methods has undoubtedly popularized chain drive, as it has resulted in production of a superior product at a considerably decreased cost.



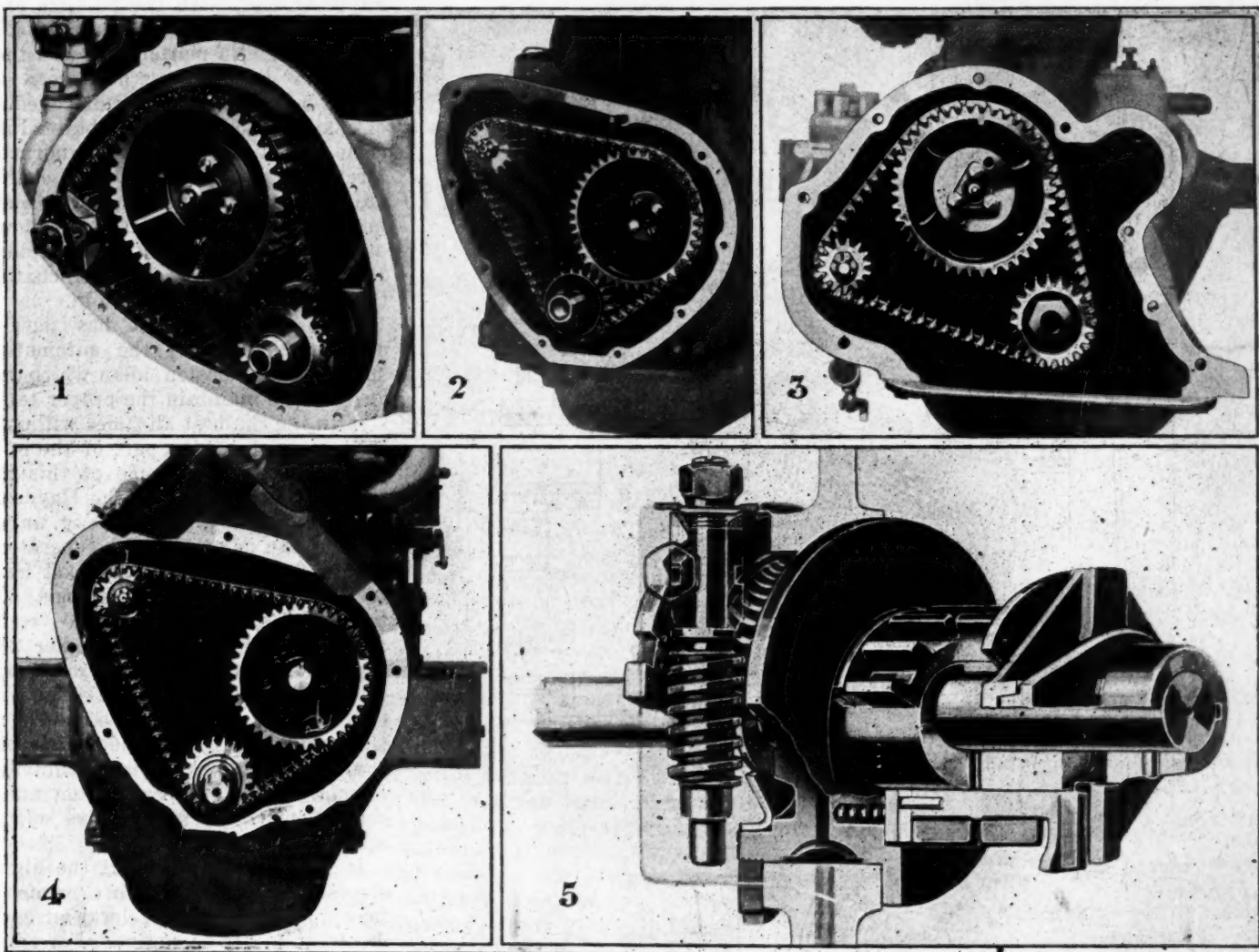


Fig. 1—New front end chain drive on Hudson. This is a triangular Morse installation with eccentric adjustment. Fig. 2—Front end chain drive installation on the Continental 6Y engine. Fig. 3—Chain front end drive on the Jordan car. Fig. 4—A triangular front end chain layout has been adopted for the new Rickenbacker car. Note that all the sprockets have more than 90 deg. chain contact. Fig. 5—Morse single type of chain adjustment

lower of the two chains has 106 pitches of  $\frac{3}{8}$  in. The upper chain has 98 pitches of  $\frac{3}{8}$  in. The lower sprocket has 27 teeth, the first idler 21 teeth and the other sprockets have 19 teeth. The double sprocket for the step-up has 27 teeth. The second idler is a duplicate of the first and the upper sprocket has 54 teeth.

In the Morse installation on the Hudson car the chain by which the camshaft and water pump shaft are driven is provided with an adjustment to take up any looseness which may develop. This is an eccentric adjustment with a notch so arranged that by the removal of three bolts a plug in the front cover can be removed, which enables the operator to determine the amount of slack in the chain. A maximum of  $\frac{3}{4}$  in. slack (up or down movement) is permitted. The chain can then be adjusted by means of the slotted adjustment piece, one notch at a time, until the desired results are obtained. The adjusting device consists of a main support, sprocket, floating coupling and end flange, with the addition of the notched adjusting mechanism. The main support has an eccentric extension which provides a bearing for the sprocket and through which the shaft passes concentrically with the mounting. The eccentric relation of the sprocket to the shaft is compensated for by means of the grooved floating couplings engaging both the sprocket and the end flange and passing to and fro with each revolution of the sprocket. In the

Hudson installation this is a ground and lapped piece and friction and wear at this point are minimized. The adjustment or chain take-up is made by rotating the support, changing the position of the sprocket relative to its driving members. This operation is accomplished by the notched adjusting piece shown in the illustration herewith.

Designs which have come out recently indicate that all manufacturers are realizing the necessity of giving an adequate angle of contact on all sprockets. Most chain manufacturers are recommending three nominal widths for passenger car engines, namely, 1 in.,  $1\frac{1}{4}$  in. and  $1\frac{1}{2}$  in. Some chain makers state that either an even or odd number of teeth may be used in the sprocket, but an odd number of links should be used in the chain, such as 51, 53 and 55, etc. The normal operating speed of the engine has much to do with the size of the sprocket which is permissible on the crankshaft. With a chain of  $\frac{1}{2}$ -in. pitch, a 24-tooth crankshaft sprocket will give 1 ft. per engine revolution per minute. For the sake of silence in operation it is undesirable to use fewer than 18 teeth in the crankshaft sprocket, which, of course, would mean 36 teeth in the camshaft sprocket. Representative chain companies recommend that all sprockets of less than 31 teeth be made of low carbon steel; that is, 10 per cent to 20 per cent carbon O. H. carbonized and hardened  $\frac{1}{32}$  in. deep.

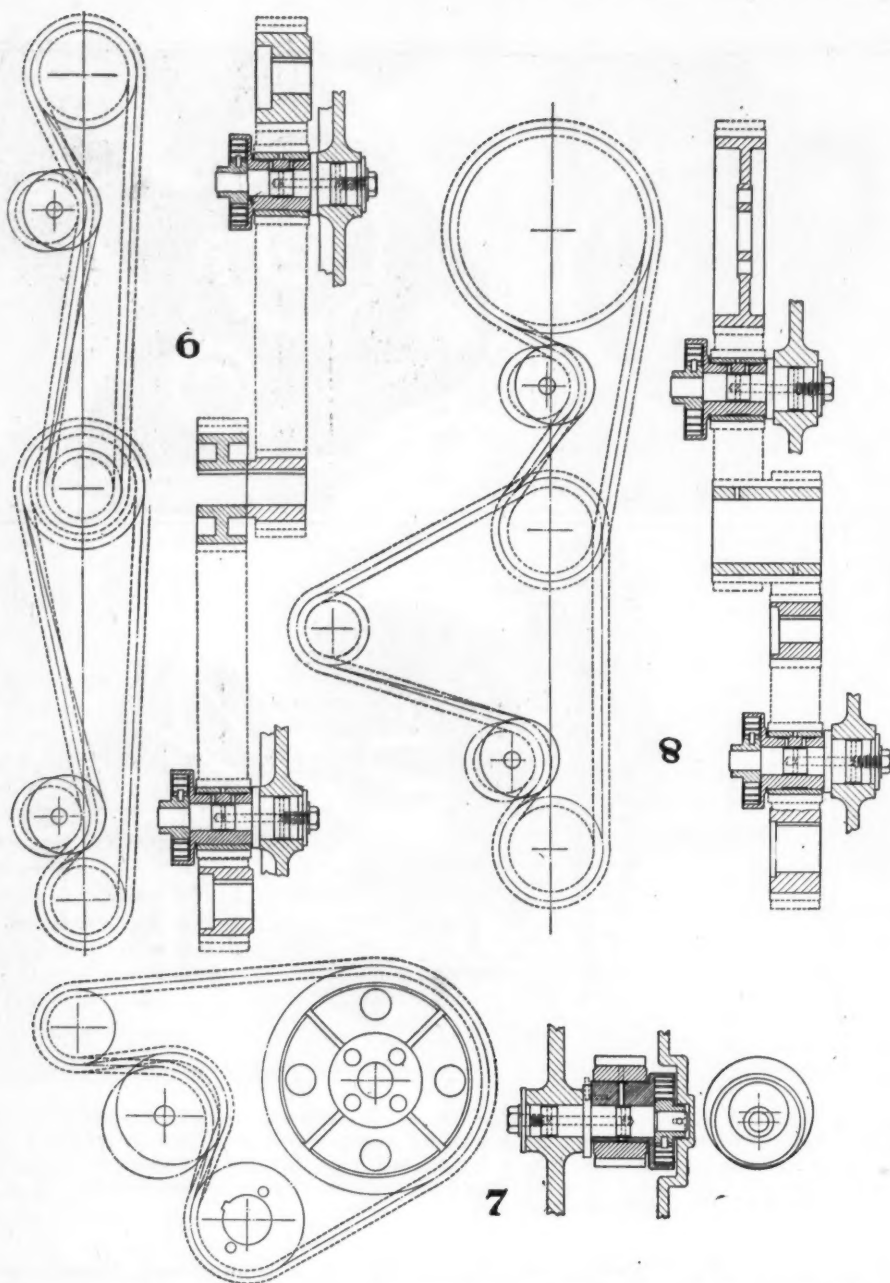


Fig. 6—On the Frontenac car the overhead camshaft is driven by a two-step Link-Belt chain layout employing two automatic idlers to maintain proper tension on each chain. Fig. 7—The new chain front end drive on the Haynes automobile engine employs an automatic idler take-up with a double sided chain. Fig. 8—The Link Belt chain installation on the Holmes car is a two-step employing two automatic tension idlers

Sprockets of more than 30 teeth are generally made of high carbon steel, heat treated, or semi-steel casting or of a very good grade of cast iron.

Probably, when all is considered, the matter which passenger car engineers are looking into more closely than

in the noises of greater volume, have now become prominent enough to cause the close scrutiny which is being given the front end drive. It may be safely predicted that next year will see even a greater increase in the percentage of chain front end drives than did 1922.

anything else, with the possible exception of silence, is the ease of adjustability. No matter how well the chain is designed or how good a layout is employed, the full benefits of chain silence cannot be obtained if some means of taking up the normal stretch is not provided. The chain adjustment must be accessible and must be of sufficient range to allow of an adjustment of one full link plus 10 per cent. On a  $\frac{1}{2}$ -in. pitch chain, this would be equal to 0.55 in.

Considerable interest has developed in the use of the automatic spring chain tension idler which is designed to maintain the proper tension in the chain at all times without any attention on the part of the operator. A good example of this is the installation used on the Haynes. This chain is a  $\frac{3}{8}$ -in. by 60 deg. unit, driving the camshaft and generator shaft. The crankshaft sprocket has 30 teeth, the camshaft sprocket 20 teeth, the generator shaft 20 teeth and the automatic take-up idler 29 teeth. The chain has 108 pitches, or, in other words, is 3 ft.  $4\frac{1}{2}$  in. in length. The advantage claimed for the automatic adjustment is, of course, that the chain is continually running at the proper tension and, consequently, the silent drive operates without noise.

It must be realized that the high stresses in chain drive are momentary due to sudden acceleration and deceleration of the engine. For this reason, the stresses in the chain run far higher than what would be calculated as required for merely driving the units involved. The stresses are of a shock nature, and, consequently, large factors of safety must be employed. The art, however, has developed rapidly during the past few years and the reliability of this type of drive has been fully established. Furthermore, other parts of the engine have been quieted to such an extent that the minor timing gear noises, which at one time were lost

## Standard Building New Speed Truck

A NEW light delivery speed truck of  $1\frac{1}{4}$  tons capacity has just been announced by the Standard Motor Truck Co. The same component parts used in other trucks of the Standard Co. are employed, these including a  $3\frac{3}{4}$  x 5 in. Continental Model N engine, Brown-Lipe multiple disk clutch and gear-set, Timken axles—model 1250 front and

6250 worm-type rear—Spicer universals, Eisemann magneto, Stromberg carbureter and Ross steering gear. The truck will have 134 in. wheelbase and be equipped with 33 x 5 in. cord tires, front and rear, alloy steel springs, all steel seat and riser and vacuum tank. It will sell for \$1,330, f.o.b. Detroit.



# European Efforts to Reduce Car Weights Bring Radical Body Construction

Extreme reduction of weight and noise features Weymann system of body building. Lends itself to production at low cost. Lancia builds a four-passenger, 122 in. wheelbase car weighing 1650 lbs. complete. Chassis frame members used as body frame members.

By W. F. Bradley

**A** FOUR-PASSENGER four-door sedan on a 130 in. wheelbase chassis can be produced with a total weight of not more than 440 lb. by the Weymann system of body building. This weight, which is about half that of a phaeton body on a chassis of similar length, comprises fenders, valances, running boards, spare wheel carrier, tool boxes and the usual body accessories. Other advantages obtained by this method of construction are entire absence of noise, which is a matter of considerable importance in a closed body, and low cost of production.

The method of body construction according to this French patent is a complete break-away from generally accepted practice. Weymann's starting point is that an automobile chassis is not and cannot be made absolutely rigid, and therefore to attempt to mount a rigid body on a flexible foundation is an illogical procedure. No matter how strongly constructed, the body must weave with the chassis and this weaving sets up noise and wear. Another fundamental fault in standard body construction is that the passengers are mounted on the body and not on the chassis, thus the body has to withstand the forces of inertia due to the weight of the passengers.

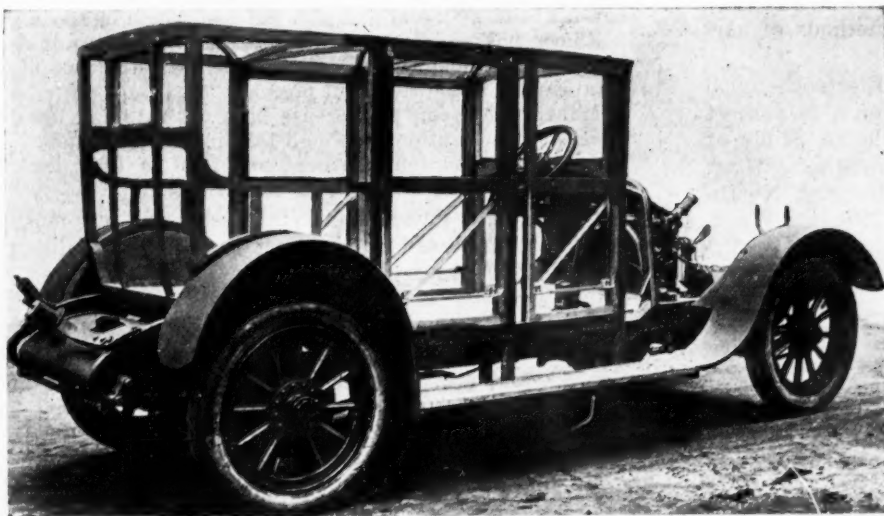
Under the Weymann system the seats are mounted directly on the frame members, independently of the rest of the body. As seats are not high, they are, practically speaking, uninfluenced by any twisting or weaving of the frame over bad roads. Another advantage obtained by

placing the seats directly on the frame members is that the total height of the body is reduced, and this, of course, involves a reduction of weight.

The body is built around these seats, but in no way attached to them. All the frame members of the body are straight and of square section  $1\frac{1}{2}$  by  $1\frac{1}{2}$  in. There are no dovetailed and glued joints, the assembly of the body members being by means of light metal angle-irons or tie-rods of the type used in airplane fuselage construction, sufficient play being left between the wood members to avoid contact. The body panels are covered with artificial leather, which is painted externally exactly like wood, or given a cane work finish. Except by touch it is impossible to distinguish these panels from those made of metal or wood.

**F**OR a sedan body four doors are fitted, but instead of making them a close fit in their frames and eliminating rattle by the use of metal or rubber wedges, from  $\frac{1}{4}$  to  $\frac{1}{2}$  in. play is left all round. The weight of each door, with the glass window, is only 6 lbs.; it can thus be hung on a pair of hinges. It is perpetually in movement when the car is under way, but as it never comes in contact with the door frame there is no noise. The gap between the door and the door frame is closed by extending the artificial leather beyond the frame on the outside and by the use of leather or cloth lining on the inside. Connection between the body and the dash board is made by artificial leather in the same way as for the panels.

Fenders and running boards are built in the usual manner, the only distinctive features being that the fenders are concentric to the wheels, and the running boards, instead of being attached to the frame members, are secured to the body. One of the greatest troubles of a sedan body is resonance. With the Weymann non-rigid frame construction and artificial leather panelling there is no tendency whatsoever for the body to resound. Cost is brought down very low by reason of the fact that the four vertical frames which form the body are built up of uniform size members and are united by very light metal angle-pieces or tie-rods, leaving nearly a quarter of an inch play



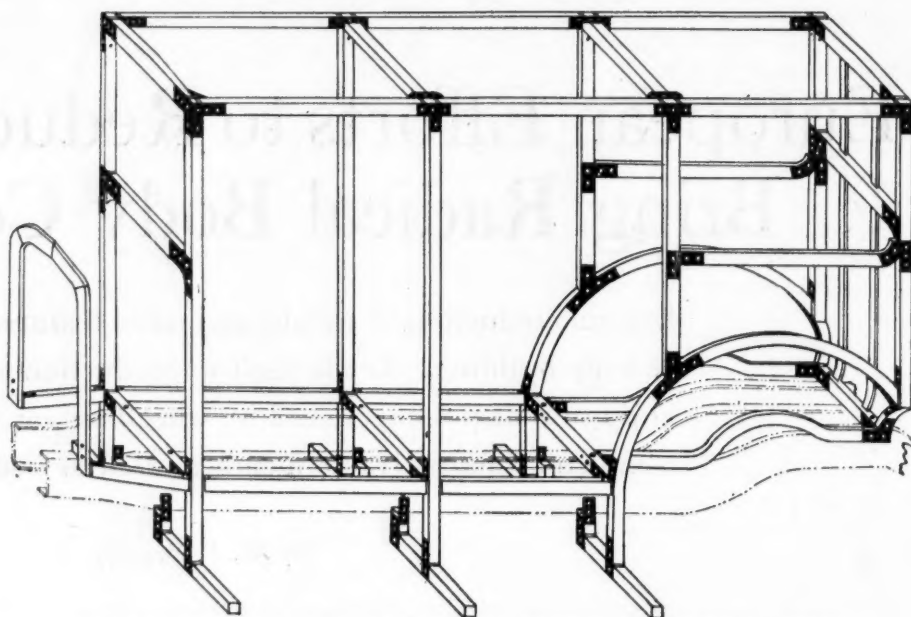
Weymann system of body construction—sedan body with four doors

between the wood members. This is a straightforward production job requiring little skill.

**A**MONG the limitations of this system of body construction is the necessity for maintaining straight lines. Only the simplest of curved forms are possible. Rounded off angles and bulbous tails have to be eliminated. The inventors believe that this is a matter of taste and fashion, and that a straight line body can be made just as acceptable to the public as a curved line construction. One of the reasons, it is claimed, why curves are so common in automobile body construction is that it is difficult to make a big, flat panel in sheet metal capable of retaining its shape.

So far only hand-built experimental bodies have been built under the Weymann patents. The saving in weight is so important compared with a body built on ordinary lines, and the absence of noise is so pronounced that details are being perfected with a view to putting it into production on a big scale. Several of the leading French firms are interesting themselves in this type of construction, particularly for sedans.

Important work has been done by Lancia in Italy toward the reduction of weight. This Italian manufacturer has produced a 122 in. wheelbase normal track four-passenger phaeton with a four-cylinder 122 cu. in. engine weighing all complete for the road, tanks filled and spares aboard, only 1650 lbs. The car has a road speed of better than 70 m.p.h. and holds to the road perfectly at this high speed.



Body frame members assembled by means of angle-irons and not in contact with each other

Lancia has obtained this result by building a car without frame members, or, to express the matter in another way, by using his chassis frame members as body frame members. There is no front axle of the usual type. Tubular steel construction is used in front and the engine is carried in a subframe. The body is built up of light steel stampings riveted together and covered with sheet metal panels. It forms a part with the chassis and is not separable from it. All the upholstery is placed inside this metal shell. This original car has been under experiment in the Lancia shops for the last two years and is about to go into production.

## Synthetic Cast Iron

**P**IG iron with a low phosphorus content produced in the electric furnace from steel turnings is usually referred to as synthetic pig iron. The process was introduced during the war, and although its use has declined greatly since then it is believed by metallurgists that it has considerable possibilities, particularly if better methods of carburizing are discovered.

At a recent meeting of the American Electrochemical Society at Baltimore a number of papers on this subject were presented. One of these bore the title "A Study of Carburization in the Manufacture of Synthetic Cast Iron" and was by Clyde E. Williams, metallurgist, Northwest Experiment Station, Bureau of Mines, Seattle, Wash. This paper dealt particularly with the advantages resulting from the use of different varieties of carbon and with the effect of slag and of impurities. Some of the conclusions drawn are as follows:

The carburizing ability of different forms of carbon decreases as the ash content increases and the denser varieties of carbon are more effective than the more porous ones. Artificial graphite, resistor carbon, petroleum coke, and coal-tar coke give better results than the higher ash cokes or charcoal.

The presence of slag decreases the rate of carburization by tending to prevent contact between the metal and the

carburizer. This action is more pronounced as the acidity of the slag increases.

Silicon carbide is an excellent medium for adding both silicon and carbon to iron. It cannot be used for introducing all the carbon because too much silicon would be carried into the metal and also the cost would be too high.

Silicon has no effect upon the rate or the degree of carburization, although it may slightly decrease the content of total carbon in the resultant pig.

Manganese seems to increase both the rate and the degree of carburization, although this increase is small.

An increase in temperature from 1350 to 1450 deg. C. has no noticeable effect upon carburization.

That this new development interests the automotive industry was indicated by the fact that H. M. Williams, General Motors Research Corp., in a paper presented at the same meeting described how cast iron was being melted in a 250-lb. furnace originally obtained for experimental purposes. Castings are made from borings, pig back scrap, and from all back scrap, and are refined and then given physical tests. Mr. Williams stated that he had made synthetic iron from boiler punchings, ferro-silicon, malleable iron from borings and steel and alloy iron of various kinds in this furnace which was adaptable to all types of melting where refining by slagging is not required.



# Lumber Situation Demands Utilization of New Woods for Bodies

Increase in number of closed bodies forces use of less expensive woods. Quality not diminished. Scientific study of substitute woods necessary. Cables to supplement strength of wood possible.

By George J. Mercer

**T**HE lumber situation as it affects the building of automobile bodies, especially closed bodies, has reached a point where it needs more careful consideration and scientific investigation. The established business of body building is using increasingly larger quantities of lumber in normal times because more bodies of the enclosed type are being built.

Ash was used exclusively in the beginning. In fact the term "body ash" was the name used in the trade for virgin growth ash. The second growth generally is harder to work by hand, hence it was used for those parts which could be worked entirely by machine. Ash has the properties of moderate weight, requisite strength, being easy to work and it does not warp or twist. It is particularly suitable for door pillars; even at the present time many builders use various woods for other parts of the framing, but make the doors of ash because it is so important that they retain their shape in order to fit properly and prevent rattle.

The increasing demand for ash naturally forced up the price and resulted in the substitution of other less expensive woods. Woods ranking next in favor with body builders are hard maple and white elm, the latter often known as gray elm. Maple being a heavier wood than ash increases the weight of a body, while elm is lighter. The use of these two substitute woods together makes an average weight equal to an all ash body.

The lumber situation has necessitated going beyond the point of substituting the two above mentioned woods. There are 600 different varieties or species of trees in the United States; 500 hardwoods and the rest soft.

The United States Department of Agriculture, Forest Service and Forest Products Laboratory have dealt with the situation through their numerous bulletins and from these much of the data in the accompanying tables has been obtained. Body builders have gone a long way, through force of circumstances, in determining the suitability of various woods and lumber dealers have co-

operated by offering many helpful suggestions.

The efforts of any one group has its limitations. It is only reasonable to think that a collective effort on the part of all those interested, including the Society of Automotive Engineers, might succeed in showing that there are a larger number of hardwoods in the country suitable for bodies than we now think. In addition, there is the opportunity offered every season when car manufacturers build models which are not sold, to make use of possible lumber substitutes without additional expense.

A competent body should authorize and approve a number of substitutes for ash, specifying where each may be used, so that the car manufacturer and body-builder can agree quickly on specifications. There are approximately 300 feet of lumber used in working up the framing of one enclosed body, and it makes considerable difference whether the lumber used is ash at \$90 to \$100 per thousand feet or part of it gum at about \$40 to \$50.

When cutting, mill operations are started on the large parts first so as to use the cuttings for the small irregular

patterns. Many of the frame parts are simply tie or connecting pieces and on these it is necessary to cut to the bone because manufacturers want cheaper bodies. But the latter must give service, hence saving in the lumber substitutes must be planned carefully and competently.

The accompanying illustration shows the framing of a five-passenger sedan body, drawn in the same manner as the shop working draft in production. Each piece is given a name and number as well as a symbol letter connecting it with its particular group or subsidiary unit. The drawing will serve as a medium by which the needed strength value can be considered.

The strength of a piece is not the only consideration in body building. Tables are available showing the beam strength or stiffness of various woods, but in body work many of the parts must have shock resisting qualities and be able to hold screws and nails, and not warp or twist to any considerable extent.

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**M**UCH help could be given to the lumber situation if a competent body should authorize and approve a number of substitutes for ash, specifying where each may be used, so that the car manufacturer and body builder could agree quickly on specifications.

\* \* \*

The possibility of using tie-wires or cables to supplement the strength required of the wood frame has not as yet been considered from the practical standpoint. There are wonderful possibilities in this type of construction and it is fair to assume that in time the cable tie will be used to obtain necessary rigidity and save weight.

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Lumber dealers grade hardwood in four classes or standard grades as follows: Firsts and seconds, which are considered as one grade, No. 1 common, No. 2 common and No. 3 common. In thickness of more than 1 in., the increase is measured by  $\frac{1}{4}$  in. It is customary to speak of the thickness of a plank as so many quarters, for instance, a 1-in. plank is termed four quarter, etc. The price is based on four quarter thickness.

The available woods that are at present used as substitutes for ash for body-framing are listed here, together with the names of the pieces and some of the characteristics compared with the wood for which they are substituted.

Use of hard maple on enclosed bodies is confined generally to the sills and sill cross bars but is often used on open bodies for the entire framing including the doors. It is a strong, close grained wood, as good as ash for the places mentioned, except that it increases the weight of the body and does not possess the shock resisting qualities of ash.

Yellow maple and beech are substitutes having qualities similar to maple. The former is less hard, has more stiffness and greater shock resisting ability than maple. Beech is nearly the equal of maple in these qualities. Both of these woods are used wherever maple is used and in addition for the main bars on the door and body.

White or, as it is generally called, gray elm, is commonly used as the substitute for ash for more parts of the body, except the sills, than any other wood. It is similar in appearance to ash and has much the same characteristics so far as working is concerned. However, it is much softer and does not have the same strength or stiffness, and is lighter in weight. It is a good substitute for most parts of the framing except the lock pillars of the doors, unless these are much larger than the usual size. It has the drawback that it does not hold nails, used to fasten the metal panels, as well as ash.

Red gum has been used in increasing quantities for seat frames, strainers and bars. Its tendency to twist as well as being a comparatively soft, weak wood has limited its use to the members mentioned.

Chestnut, sound, wormy oak and the hard pines are used for floor and running boards.

TABLE I.

Species	Strength as a beam or post	Stiffness	Shock resisting ability	Hardness
Ash—white, forest grown....	100.0	100.0	100.0	100.0
Ash, black .....	71.3	79.3	90.1	62.3
Ash, white, second growth....	122.5	117.6	119.6	118.9
Basswood .....	59.1	80.6	40.5	29.6
Beech .....	93.5	96.9	96.0	90.0
Birch, yellow .....	104.8	116.8	120.6	80.9
Chestnut .....	66.0	71.9	53.4	35.3
Cottonwood .....	60.6	79.0	54.3	35.3
Cucumber .....	85.4	112.4	76.7	54.9
Elm, rock or cork .....	98.8	92.9	140.5	101.6
Elm, white .....	79.2	79.5	89.5	57.1
Gum, red .....	80.7	91.5	75.5	59.0
Gum, tupelo or cotton.....	81.4	82.5	63.5	77.3
Hickories, pecan .....	103.5	103.8	119.7	139.6
Hickories, true .....	126.6	120.2	173.9	150.4
Maple, red .....	90.0	101.2	78.7	75.4
Maple, silver .....	66.9	68.5	71.7	64.3
Maple, sugar .....	104.7	105.9	90.5	103.0
Oaks, all kinds .....	92.6	101.3	94.9	104.5
Poplar, yellow .....	67.3	93.8	41.5	37.9
Fir, Douglas, Pacific Coast				
Conifers .....	95.7	122.1	59.9	58.3
Pine, loblolly .....	93.7	105.6	71.0	60.0
Pine, longleaf .....	112.2	122.1	77.7	74.8
Pine, shortleaf .....	94.1	100.6	69.7	64.0
Pine, Western white .....	75.5	99.7	53.8	37.0
Pine, Western yellow .....	67.0	75.6	42.9	41.0
Spruce, Sitka .....	69.5	94.1	63.3	44.9

TABLE II.

Kind of wood	Cost per 1000 board feet	Weight in lbs. per board foot	
		Air dry	Green
Class A Stock—Grade F & S. Thickness 6/4			
Ash .....	\$100.00@ \$110.00	3.8	4.6
Hard Maple .....	75.00@ 85.00	3.9	5.4
White (grey) Elm.....	75.00@ 85.00	3.1	4.75
Birch .....	100.00@ 110.00	4.0	5.5
Beech .....	80.00@ 85.00	4.0	5.75
Class B Stock			
Soft Elm .....	75.00@ 85.00	3.1	4.7
Soft Maple .....	75.00@ 85.00	3.3	5.0
Grade No. 1, Common			
Qtrd. Red Gum .....	70.00@ 80.00	3.3	5.5
Plain Red Gum .....	60.00@ 65.00		
Sound Wormy Oak.....	50.00@ 55.00	4.0	5.5
Sound Wormy Chestnut.	42.00@ 44.00	2.8	5.0
Panel Stock—Grade F & S. Thickness 4/4			
Poplar .....	110.00@ 120.00	2.8	3.9
Basswood .....	80.00@ 83.00	2.5	4.2
Cottonwood .....	65.00@ 70.00	2.8	4.6

Table I is taken from the circular issued by the Forest Products Laboratory in which they refer to their bulletin No. 556, entitled "Mechanical Properties of Woods Grown in the United States." This table gives four of the physical properties of woods useful for automobile body construction in comparison with forest growth white ash, which is rated at 100.

Of the woods enumerated, the hickories are not body woods, their use being confined to wheel manufacture. The conifers or cone bearing woods have never been considered for body work except for floor and running boards, while the rock elm has been used for trim rails on open bodies. It is particularly well suited for this because it can withstand the strains of fitting to the body without splitting.

In Table II some of the woods enumerated in the Forest Products Laboratory list have been classified under two divisions, A and B, and their weights per square foot and market value per thousand feet given. In Table III the list of the members shown on the drawing are tabulated and the woods possible to use for each are given.

The woods enumerated in Classes A and B are those that have been used for some time by some, if not all, body-builders, and by looking at the prices it can be readily seen that what are considered the least suitable woods for body building have become, through their use in other industries and the additional demand from body builders, so high in price that their use as body framing substitutes is debatable.

As mentioned before, it will be necessary to go further afield and try entirely new sources. One wood that the writer has used is the eucalyptus. This is a native of Australia, but is being cultivated in this country in places that have a limited water supply. It grows quickly and the wood is similar to birch.

Bodybuilding is being developed to permit an increase in the use of steel for panels and it is reasonable to suppose that in time the panel will be so constructed as to bear a larger share of the stress. When this objective in the trade is developed, a decrease in the use of wood will be possible, but even then we will require a wood filler to hold the tacks, screws and nails, and therefore wood for body frames must be of a reasonably firm and hard nature.

Present practice requires a wood for body construction similar to those listed as Class A, Table II. It is important to reiterate the time honored injunction as to the necessity of the layout mill man selecting the planks properly so that the pillars and top rails are cut with the heart side of the plank in correct position to maintain the body shape, because the sap side of the plank will shrink more than the heart side and as a consequence the heart side will be the round or convex shape.



Door pillars should be cut to help the convex shape, as they tend to become straight in use due to the strain of the lock, and the companion pillar on the body should be the reverse so as to help to exaggerate or offset this tendency. In the case of the body toprail, one piece should be made to counteract the tendency of its companion piece.

One avenue that has not as yet been considered from the practical standpoint is the possibility of using tie wires or cables to supplement the strength required of the wood frame. At present the cost of wood is not high enough in price to make experiments in this direction necessary. There are wonderful possibilities in this type of construction and it is fair to assume that in time bodies will be made, incorporating the cable tie to obtain necessary rigidity.

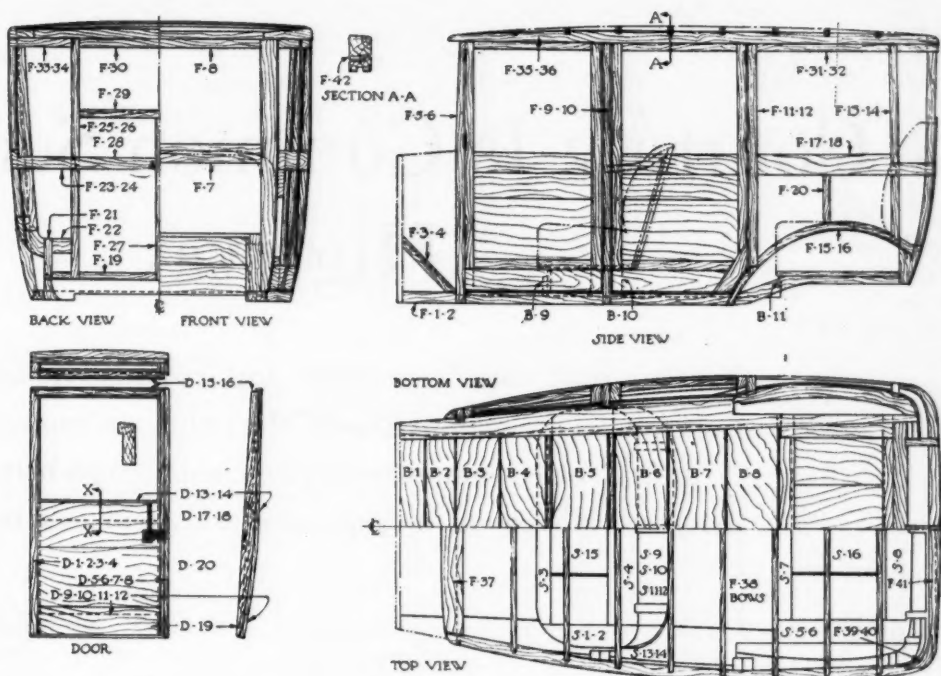


TABLE III					
Part Number	Name of Part	Class of Stock			
F-1 and 2	Body sill left and right	A	D-5 and 6	Ft. door lock pillar L and R	A
F-3 and 4	Toe bracket L and R	B	D-7 and 8	R. door lock pillar L and R	A
F-5 and 6	Pillar No. 1 L and R	A	D-9 and 10	Ft. door bottom bar L and R	B
F-7	Front middle bar	B	D-11 and 12	R. door bottom bar L and R	B
F-8	Front header bar	A	D-13 and 14	Middle bar L and R	A
F-9 and 10	Pillar No. 2 L and R	A	D-15 and 16	Header bar L and R	A
F-11 and 12	Pillar No. 3 L and R	A	D-17 and 18	Lock board L and R	B
F-13 and 14	Pillar No. 4 L and R	A	D-19	Lower lining board	B
F-15 and 16	Wheelhouse framing L and R	A	D-20	Middle lining board	B
F-17 and 18	Quarter middle bar L and R	B	B-1	Toeboard number 1	B
F-19	Tail bar	A	Ba2	Toeboard number 2	B
F-20	Strainer	B	B-3	Treadboard number 3	B
F-21	Wheelhouse upright	B	B-4	Treadboard number 4	B
F-22	Block	B	B-5	Bottomboard number 5	B
F-23 and 24	Middle corner block L and R	B	B-6	Bottomboard number 6	B
F-25 and 26	Back light pillar L and R	B	B-7	Bottomboard number 7	B
F-27	Strainer	B	B-8	Bottomboard number 8	B
F-28	Middle back bar	B	B-9	Ft. seat heelboard front	B
F-29	Back light lower bar	B	B-10	Ft. seat heelboard rear	B
F-30	Back light header bar	B	B-11	Rear seat heelboard front	B
F-31 and 32	Quarter header bar L and R	B	S-1 and 2	Ft. seat side L and R	B
F-33 and 34	Corner header block L and R	B	S-3	Ft. seat front bar	B
F-35 and 36	Toptail L and R	A	S-4	Ft. seat rear bar	B
F-37	Front toprail	A	S-5 and 6	Rear seat side L and R	B
F-38	Bows	A	S-7	Rear seat front bar	B
F-39 and 40	Toptail corner block L and R	B	S-8	Rear seat rear bar	B
F-41	Back toprail	B	S-9	Ft. seat center strainer	B
F-42	Sidelight piece	B	S-10	Ft. seat center toprail	B
D-1 and 2	Ft. door hinge pillar l. and r.	A	S-11 and 12	Ft. seat corner strainer L and R	B
D-3 and 4	r. door hinge pillar L and R	A	S-13 and 14	Ft. seat corner toprail L and R	B
			S-15	Ft. seat board	B
			S-16	Rear seat board	B

## Experiments Show Power Loss in Automobile Tires

THE rubber laboratory of the Bureau of Standards is equipped with a special dynamometer for determining, among other things, the power loss in automobile tires. A great many of the standard makes of tires have been tested on this dynamometer, and valuable data are being obtained concerning the percentage of the power of an automobile engine which is absorbed by the tires under various conditions.

Some interesting figures have already been secured as a result of this work. For instance, an average 4-in. fabric tire, under conditions of normal load and air pressure, will absorb approximately .90 h.p. due to rolling resistance at a speed of 25 miles per hour. Under the same conditions, the power loss in a 4-in. cord tire is approximately .60 h.p., while a 5-in. cord tire represents a loss of 1.20 h.p.

# Courtesy Is Common Sense on the Highways

Truck "road hogs" promote unfavorable vehicle legislation. Courtesy on the road will "sell" the public on truck transportation. N. A. C. C. truck committee begins campaign on better manners for drivers. Movement means more sales and less restrictive laws.

**P**UBLIC opinion about truck transportation will play an important part in determining the number and character of future truck sales. Truck manufacturers can help materially to influence that opinion favorably by taking advantage of a bit of simple human psychology.

Most people form their opinions as a result of their personal experiences, however narrow, and base these opinions largely upon feeling rather than logic.

If Mr. Public is driving along a highway and suddenly finds a huge motor truck blocking his path, he will form his opinion of truck transportation almost exactly in accordance with the difficulty which he has in passing that particular truck. His voice is eventually going to be raised in connection with truck legislation. What he says will probably be determined largely by his own contacts with trucks.

He should form his opinion "on the basis of a careful study of the economic function of the truck in providing efficient and effective transportation." But he doesn't. It is hard to interest him in such subjects.

He is very much interested, however, in "road hogs." His interest in passing trucks can't be kept down.

By taking advantage of this general human tendency to generalize on the basis of specific instances, truck manufacturers can "sell" truck transportation to the public, to legislatures, and to all others concerned in the use and operation of commercial vehicles.

This fact is recognized in the movement just launched under the direction of F. W. Fenn, secretary of the Motor Truck Committee of the N. A. C. C. The National Motor Truck Committee has just started a campaign on the importance of courtesy on the highways, directed to all motor truck drivers in the country.

The committee has prepared literature which it will distribute with the aid of manufacturers to dealers, motor truck traffic manager and fleet owners, and through these latter to truck operators.

The following form letter, which is designed for dealers and fleet owners, give an excellent idea of what the committee has in mind in conducting this campaign.

With the entrance of over 1,000,000 motor trucks into the freight transportation field there has arisen a need for driver courtesy on highways. Discourtesy on the part of truck drivers cannot be tolerated to any large extent, inasmuch as trucks are engaged to-day in a very important transportation service,

and in the words of President Harding, "they are not only feeders to the railroads and offer relief from their local burdens; they are actually lines of motor traffic in interstate commerce."

In view of this, we are suggesting to traffic managers all over the country, under whose direction our motor truck fleet are operating, to hold company meetings or dinners, at which the drivers will be present when the keynote of driver success is sounded.

May we make the following suggestions for incorporation in your speech:

1. A truck, when properly handled, becomes an important factor in the advancement of

humanity. Any discourtesy committed lessens the truck's economical prestige.

2. Driver discourtesy must not be tolerated as it creates public opinion antagonistic to highway transport.
3. Follow up personal injury cases by seeing that injured is taken immediately to hospital, regardless of who is at fault.
4. Drive at a moderate rate of speed at all times.
5. Avoid trying to take chances that other drivers do.
6. Give ample warning to pedestrians or vehicles that are about to be passed.
7. Recognition of fact that pedestrians crossing streets have prior rights at crossings.
8. Watch especially children playing on streets and sidewalks; regard them as your own children.

If you will kindly inform me how many drivers you have in your fleet I will be very glad to send you as many copies of the enclosed pamphlet, "Common Sense on the

**W**HEN the French had their backs against the wall at Verdun, the slogan "They shall not pass," served as a rallying cry. It was appropriate to the occasion.

But there is a time for all things.

Too many truck drivers in America have adopted "Ils ne passerons pas" as their motto. And to the regular user of the highway the words constitute a real battle cry.

\* \* \*

Courtesy creates goodwill. Goodwill creates favorable legislation. Favorable legislation increases profitable sales. Profitable sales make successful truck manufacturers. The Courtesy Campaign is worthy of sincere and active support.



Highway" as you feel will be necessary for distribution.

Courtesy is the lamp that lights the way to efficient operation, and only through a united effort can success be attained and highway transport established on a firm foundation.

Will you help?

A booklet for drivers has also been prepared which shows the driver why courtesy pays from his standpoint. This booklet incorporates the Briggs cartoon which accompanies this article, along with material like the following:

Courtesy is as cheap as the air you breathe—practice it on those with whom you come in contact on the highways. *IT PAYS!* When you are aware that a faster moving vehicle is trying to pass, *move to the right at*

*I'm for driving them off the highway," or, with a smile, "THANK YOU, OLD TOP"—or "ATTA BOY."*

Your GOOD WILL lies at stake. Good will is represented in:

Your right to a place on the highway.

The capital investment in vehicle and load from which you receive your income.

Whether the public classes you as a necessity or a nuisance.

**HANG ON TO THAT JOB!**

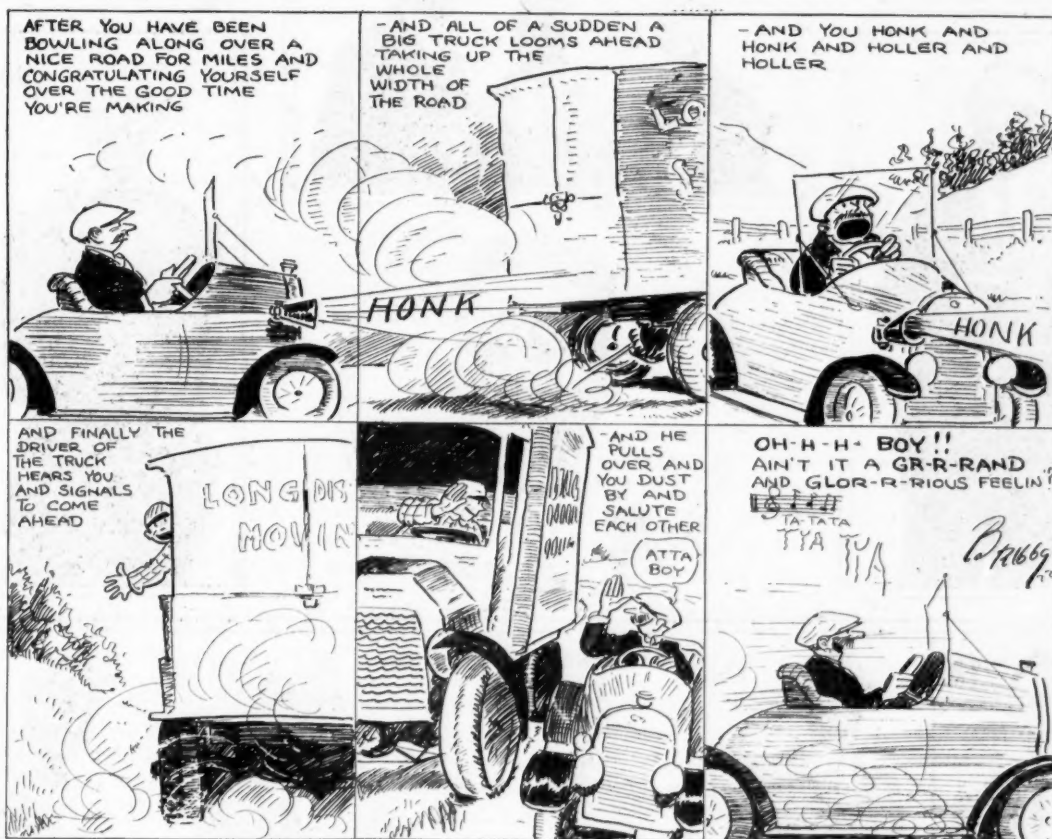
**PROTECT THAT INVESTMENT!**

**PRESERVE THAT GOOD WILL!**

**IT IS YOUR MEAL TICKET—DON'T BE FOOLISH AND THROW IT AWAY!**

Public opinion can make or break an industry. The time passed years ago when a business could afford to

### AIN'T IT A GRAND AND GLORIOUS FEELING?



the first opportunity. Give the passing vehicle a cheerful greeting as it goes by.

CHEERFULLY sharing the road with others makes friends. BLOCKING the road makes an unnecessary enemy. **YOU CAN'T AFFORD TO MAKE ENEMIES—THEY MAY PROVE EXPENSIVE.**

THE MAN in the car behind may be the GOVERNOR OF THE STATE, bound for the capital—or an important member of the State Legislature. Can there be any satisfaction in delaying them? *They have it in their power to drive you from the highway—to throw you out of your job.*

BE CHEERFUL—Let them pass.

You hear a horn—it may be a Doctor on an ERRAND OF MERCY—**YOU WOULD NOT WILLINGLY OR KNOWINGLY TAKE A LIFE.** But you may if you persist in holding the center of the road. LET HIM PASS—with a spirit of "GOD SPEED."

Are you going to let them say, "DAMN THE TRUCKS,

disregard the opinion held of it by people in general. The general growth of educational facilities and the increased distribution of information through the press both tend to make public opinion of constantly growing importance.

The automotive industry has had occasion to learn this on numerous occasions. If the public thinks the automobile is essentially a luxury vehicle, automotive manufacturers will continue to pay excessive taxes and, consequently, to operate under less favorable sales conditions than would otherwise be the case.

If the public thinks motor trucks tear up the highways and hold up traffic so badly as to offset any value they may possess as economic means of transport, that opinion will be reflected in legislation adverse to the motor truck. Some such legislation has already been passed. Motor truck manufacturers are intimately concerned with the legislative future as regards their product.

## SOME PROMINENT MEN AT THE S. A. E. SUMMER MEETING



Photographs by N. Lazarntick

Fig. 1—F. S. Duesenberg. 2—F. S. Slocum. 3—F. E. Moskovics, Nordyke & Marmon. 4—H. E. Rice. 5—R. J. Nightingale, Willard Storage Battery Co. 6—F. W. Andrew, Eisemann Magneto Corp. 7—F. Jehle, Aluminum Manufacturers. 8—H. R. Williams, Beaver Truck Corp. 9—F. Jardine, Aluminum Manufacturers. 10—Azel Ames. 11—W. G. Wall, National Motor Car Corp. 12—B. G. Koether, Hyatt Roller Bearing Co. 13—R. E. Northway, Northway Motors Corp. 14—G. W. Vaughn. 15—J. M. Germaine, Gilliam Mfg. Co. 16—W. I. Ralph, Class Journal Co.



# Performance of Lubricants Needs More Research

Dearth of precise information as to their properties and the effect of various factors upon their value as lubricants, a heavy handicap to their intelligent use. Effect of dilution and other factors bearing upon serviceability are subject of some investigations.

By Herbert Chase

**S**O little fundamental information on the subject of lubricants and the factors which determine their suitability for automotive uses is in existence that rule of thumb methods are still very largely used as a basis for the production, sale and utilization of both oils and greases. Under these circumstances the need for thorough-going research work is very apparent, but little such work is in progress so far as the public is generally informed. For the most part the various oil companies are either doing no research work at all or are keeping such work as is being done a strict trade secret. The Bureau of Standards is one of the few organizations which has conducted basic research on lubricants in this country, and the staff of men and funds available for this purpose at the Bureau has been so limited that progress has been extremely slow.

## Basic Research

One of the few other pieces of basic research being undertaken to our knowledge is that in process under the direction of Professor R. E. Wilson, of the Massachusetts Institute of Technology. This work is being conducted on behalf of the General Motors Research Corp. and the Standard Oil Co. The major portion of the results thus far obtained are expected to be ready for publication at an early date. One report is to cover the subject of fluid fuel lubrication of journals and is to include correlated data taken from the meager available literature on the subject. A second report is intended to deal with the fundamental properties of lubricants, with special reference to the rather elusive property of "oiliness" which is possessed in greater or less degree by all true lubricants. The methods used in measuring and investigating this property are to be described, together with examples of the results which have been obtained to date. Wilson is also doing some work with a view to determining the solubility of fuel in oils.

Some of the most recent work done at the Bureau of Standards is described in a paper entitled "Viscosity and Friction," by W. H. Herschel, which was presented at the last annual meeting of the Society of Automotive Engineers. In this paper the author discusses at length the effect of viscosity in complete film lubrication and comments upon various methods for measuring viscosity. Herschel states that "if all the changes of the lubricant with time, by evaporation, oxidation or otherwise are disregarded, the only remaining properties that determine the friction are viscosity and oiliness." It appears

that while many investigators have observed the pressure, speed and coefficient of friction, few have paid attention to measurements in this connection of the viscosity and the clearance in the bearing which are said to be of equal importance. "With complete film lubrication, viscosity is the only property of the lubricant that needs to be considered. With incomplete film lubrication, the differences in friction with different lubricants under otherwise identical conditions cannot be accounted for by differences in viscosity. Therefore it is necessary to consider some other property or properties of the lubricant. This property is only vaguely understood; it is not identified with any recognized physical or chemical constants and is known by a variety of names such as "body, oiliness, greasiness and the like." The author then describes various testing machines intended to measure the oiliness of lubricants and shows how high pressures tend to produce incomplete film lubrication and the manifestations of difference in oiliness.

Among the conclusions reached are the following:

Friction tests with complete film lubrication can give no information in regard to the quality of a lubricant, and viscosity is measured more readily with a viscosimeter.

The only use of a friction-testing machine for determining quality of a lubricant is in measuring oiliness, and this must be done at high pressures, low speeds or other conditions which cause incomplete film lubrication. It can be assumed that the pressure must be over 800 lb. per sq. in. or the speed less than 40 ft. per min.

Bearing metals also should be tested with incomplete film lubrication.

It is impracticable to keep a constant smoothness of rubbing surfaces with a journal bearing, so that changes in friction, commonly supposed to be due to changes in quality of lubricant, are generally due to changes in smoothness.

Service tests are even more untrustworthy than friction tests, because there are a multitude of bearings whose temperature cannot be controlled or estimated readily.

The best solution of the difficulty appears to be the use of a disc machine. The disc could be kept of constant smoothness by removing an interchangeable veneer and subjecting it to a standardized polishing process after the test of each oil, if necessary. A journal could not be kept polished in this way because the radius of curvature, and consequently the film thickness, would be changed.

Among the factors being given much consideration at the present time is the effect of dilution of lubricants by fuel which in nearly all present-day automotive engines reaches the crankcase largely as a result of leakage of

fuel by the pistons. It is understood that the International Harvester Co. has done some work, with a view to determining the effect of dilution and other factors upon viscosity. An effort is being made to continue this work at Ohio State University. The results obtained to date indicate that certain oils lose their viscosity to a considerable extent even when used with fuels with which dilution is said to be impossible. Other fuels are said to become less viscous when used with kerosene as fuel, which causes dilution, but are not affected by fuels which do not cause dilution. A third class is said not to be affected either by diluting or non-diluting fuels. The complete results of tests have not yet been made public.

Tests are being made at the Iowa State College under the direction of Professor J. B. Davidson, in which a number of oils are subjected to practical running tests prior to and at the end of which their characteristics are determined. It has of course been found that some oils are much more stable than others, but means for predetermining these characteristics have not been found.

C. W. Stratford, of the Associated Oil Co., is planning research work with the intention of learning how the chemical stability of various oils can be increased. It is hoped to develop laboratory methods of determining chemical stability without recourse to expensive and more or less unsatisfactory tests in engines which have heretofore been depended upon in measure to determine changes in chemical and physical characteristics.

#### Carbon Residue Tests

It is a well-known fact that oils of certain character are more prone to cause carbon deposit than others of different character. Various laboratory tests, including the Conradson carbon residue test and the Waters oxidation test, are used for this purpose, but it is not definitely known to what extent measurements made by these methods can be depended upon to predict the carbon forming tendencies of an oil in practical service. Some tests along this line have been made in certain laboratories, but the results have not yet been published.

Engine friction is known to be quite largely dependent upon the viscosity of the oil used, and viscosity is, of course, affected to a considerable degree by the temperature of the oil, which in turn is dependent upon engine temperature. In tests made by the Fifth Avenue Coach Co. a saving of as much as one hp. in friction at moderate engine speeds has been shown to result from the use of a light oil as compared to another of higher viscosity. This saving in power is expected to result in considerable saving in fuel, especially at the light loads of normal use, and further tests along this line are to be conducted.

#### Viscosity

To what extent it is justifiable to reduce viscosity as a means for reducing friction or to permit viscosity to be reduced by fuel dilution, without undue sacrifice in wear of bearings, cylinders and other parts, is a question which should receive further study and will doubtless be the subject of further research and experimental work in the future.

The relative value of greases as compared to oil, of greases of various character as compared to each other, and of solid lubricants, especially graphite when used in connection with grease and oil, also requires further study before certain conclusions as to relative merit can be reached. Tests made in England as well as in this country are said to have shown that considerable advantage results from the use of finely divided graphite in lubricating oil. Similar claims are made also for graphite grease lubricants, but authoritative data are lacking.

Research both here and in England indicates that small quantities of animal or vegetable oil added to mineral oil render the latter more suitable for engine lubrication, especially when high temperatures are involved, but further tests in this connection seem to be required before this fact is definitely established or at least before it is determined what proportion and what character of non-mineral oils are best suited to various conditions of service.

## High Tariff Wall Prevents Exportation of American Automotive Products to Germany

THE development of the automobile industry in Germany following the war is reported to have made great strides. In spite of many handicaps, it is, by comparison with other industries in the country, one of the healthiest. This is the finding of a survey made for the Automotive Division of the Department of Commerce.

Passenger cars registrations which are indicative of growth when increasing, show this particular field of automotive transportation to be expanding rapidly. From February 1, 1920, until March, 1922, the increase in registration has been approximately as follows:

February, 1920 .....	32,000
July, 1921 .....	60,000
January, 1922 .....	78,726
March, 1922 (estimated) .....	85,000

As a result of the agricultural industry's adoption of motor trucks as a means of transportation, the demand for trucks is growing fast. The present registration of trucks (30,424) is declared to be an increase over 1914 of 300 per cent. Motor truck transportation is also gaining in favor because of success in competing with railroads.

Germany has been conducting a comparatively active export trade. Exports of passenger cars and trucks numbered 17,534 in 1920 and 5,810 in the last 8 months of 1921.

Imports have been kept low and totaled 347 in 1920, and 361 in the period of 1921, coming chiefly from Austria.

The cause of the surprisingly small number of importations, and incidentally the almost total exclusion of the American product, is due to the high tariff wall built around German production.

The existence of a rigid foreign trade control, policed in this instance by the "Aussenhandelsstelle fuer die Fahrzeug Industrie," Berlin, composed in part by manufacturers and constituting a semi-governmental agency with discretionary powers to refuse import permits, makes for an added exclusion of foreign wares calculated to compete with the home industry.

There is little likelihood that foreign cars will be able to enter the German market under the present system of control, especially since Germany can export automotive products while retaining her raw materials and food-stuffs. It is still questionable whether German automotive goods have reached world markets, and it is doubtful whether countries having a more favorable exchange rate with Germany, although soaring higher every month, can compete with German manufacturers in German markets, when one considers cost of production and the many obstacles to be overcome.



# How to Build Aluminum Tanks for Automotive Use

98 per cent pure sheet aluminum in half hard condition employed.

Welding process requires sheet scraps or welding wire of same chemical composition. Care taken to insure clean working surfaces. Tank fittings should be machined from rolled aluminum.

**T**HE best material for aluminum tanks for aircraft and other automotive purposes is sheet aluminum which is 98 per cent pure. In the soft condition it has a tensile strength of 12,000 lb. per sq. in., and an elongation of 25 per cent; and in the half hard condition a tensile strength of 18,000 lb. per sq. in., and an elongation of 6 per cent. The use of the half hard condition sheet is recommended. The most practical gages of material for tank construction are: No. 20 (.032), No. 18 (.040), No. 16 (.051) and No. 14 (.064) B & S Gage.

Welding can be done with scrap strips of the sheet or with a welding wire of the same chemical composition. If rivets are used they should also be of the same chemical composition as the sheet.

In inserting heads in tanks, joining in bulkheads, and welding on fittings, a corrugation similar to that shown in Fig. 1 has to be rolled or pressed into the sheet adjacent to and around the weld. This is to localize and relieve shrinkage and expansion stresses set up by welding. The best and most economical method of welding requires that the edges of the sheets to be joined be bent up at an angle of 45 deg., an amount equal to three times the thickness of the sheet, as in Fig. 1. The edges should then be cleaned with a 10 per cent solution of either nitric acid or tri-sodium phosphate which must be thoroughly washed off with clear water after applying. A welding flux composed of 17 per cent sodium chloride and 83 per cent potassium chloride, or one composed of 30 per cent sodium chloride, 3 per cent sodium

sulphite, 15 per cent lithium chloride, 45 per cent potassium chloride and 7 per cent potassium fluoride is then applied with a brush or swab. The edges are then brought together and tacked about every 2 in. with the oxy-acetylene torch. The edges are held with pliers or a clamp while the spots are being melted or fused, as in Fig. 1. Welding is to be done with the oxy-acetylene torch by melting down and fusing together the two edges of the sheets until the under side of the joint on 45 deg. work is well filleted out, and on flat work is slightly concave. It is essential that the edges be melted down very carefully and evenly to avoid weak spots. All welds are to be left undressed.

**B**ULKHEADS or baffles should be turned up at 45 deg. as shown in Fig. 2, and riveted to a "V" shaped corrugation in the tank shell. Aluminum rivets  $\frac{1}{8}$  in. in diameter should be used, spaced about 3 in. apart. The rivets are to be headed up but not fully flattened, as is customary in ordinary riveting. The heads of the rivets are welded with the oxy-acetylene torch using regular welding wire as filler. Holes of sufficient size are usually provided in the bulkheads to permit free flow between the compartments. Where necessary, the bulkheads are stiffened by rolling a "V" shaped corrugation in them. All flat surfaces, such as tank heads, should be stiffened with corrugations similar to those used in tank sides where bulkheads join as in Fig. 2. The "V's" should project into the tank, making a flush external surface.

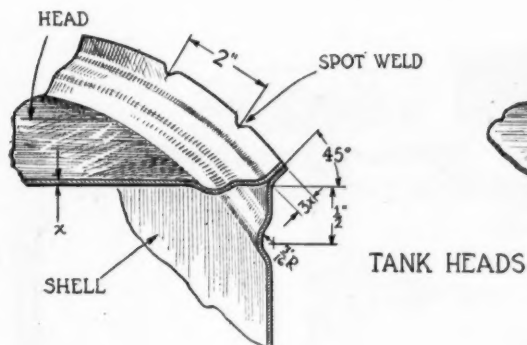
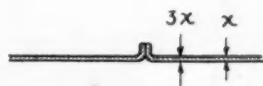
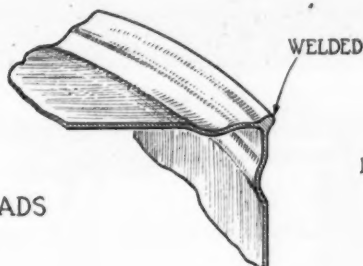


Fig. 1



FLAT PLATES

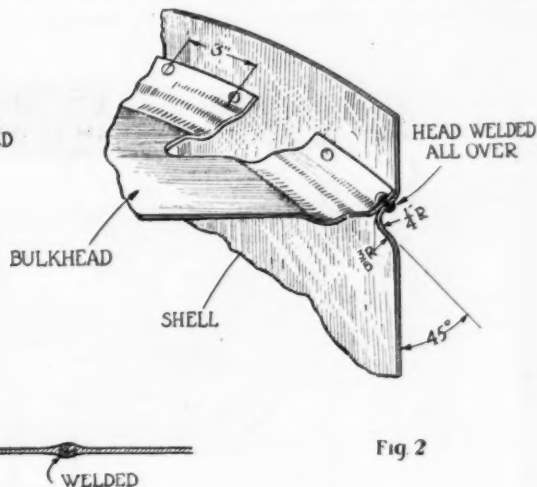


Fig. 2

Fig. 1—Corrugation rolled or pressed into sheet adjacent to and around weld, when inserting heads in tanks, joining in bulkheads, and welding on fittings

Fig. 2—Bulkheads or baffles turned up at 45 deg. angle and riveted to a "V" shaped corrugation in the tank shell

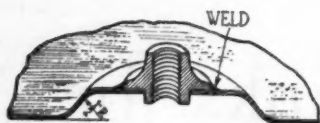


Fig. 3—Tank "bumped" at point of attachment and casting welded on

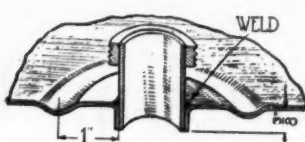


Fig. 4—Liberal use of welding rod shown

All tank fittings, wherever practicable, should be machined from rolled aluminum which is 98 per cent pure. Where this is not practicable, the fittings should be cast from aluminum alloy conforming to the SAE Standard Alloy No. 1, Specification 30, of which the chemical content is as follows: Aluminum, not less than 90 per cent; copper, 8.5 to 7 per cent; total impurities, 1.7 per cent; maximum zinc, 0.2 per cent. Castings should have well filleted corners and should have holes cored, rather than be cast solid and then drilled, in order to keep the section as uniform as possible and thus avoid porosity from uneven shrinkage. Where castings can be made with a flange the tank should be "bumped" at the point of attachment and the casting welded on as shown in Fig. 3.

Where a flanged casting is not practical, or where a sheet metal cylinder is the joining medium, the edges of the tank should be bent in at 90 deg., an amount equal to  $\frac{3}{8}$  inch, and a bead rolled around the opening as in Fig. 4. Liberal use of welding rod is to be recommended, as shown in Fig. 4.

Where annealing is necessary, it can best be done by moving a flame over the surface to be softened until a piece of newspaper rubbed on the metal will just leave a brown mark.

After the tank is completed and before it is installed, it should be thoroughly cleaned by filling with and submerging it in a 10 per cent solution of sulphuric acid for one hour, in order to remove the welding flux. It should then be washed thoroughly with clean water. This treatment is essential when the tank is to contain gasoline. However, it should not be undertaken with any fittings other than those of aluminum on the tank, since then electrolytic action would be sure to begin and the aluminum tank would become pitted.

The foregoing covers most of the standard production methods of aluminum tank construction as far as developed up to the present.

## Stewart "Utility Wagon" Has Buda Engine

New speed truck capable of 35 to 40 m.p.h. Wheelbase 128 in. Clark internal gear drive type axle.

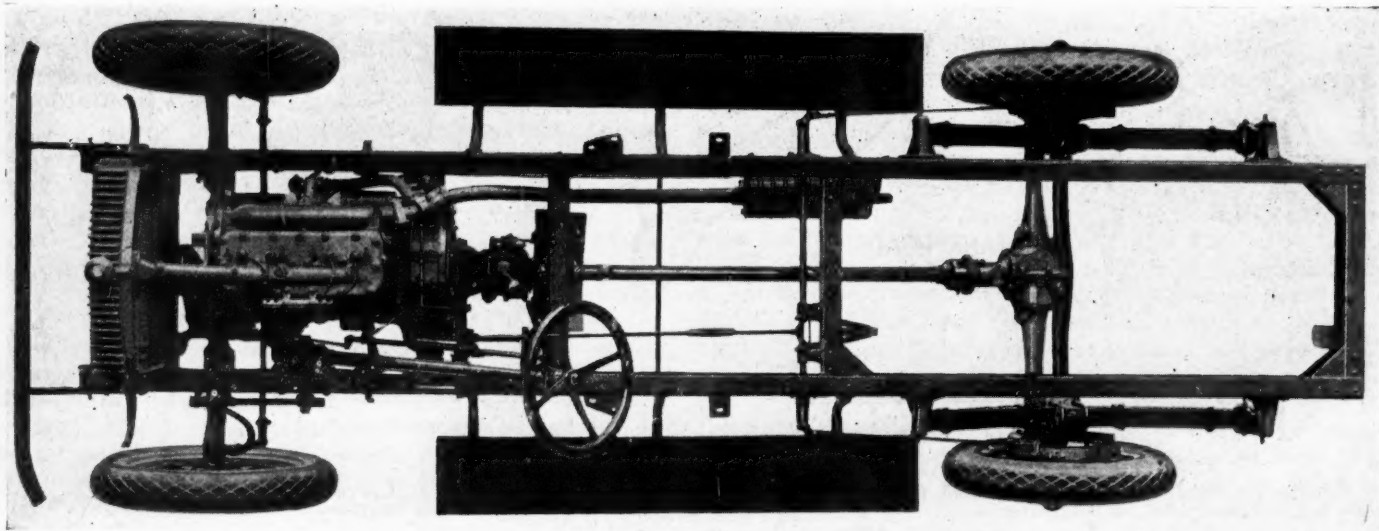
**A** NEW utility truck with 128 in. wheelbase and a maximum load capacity of  $1\frac{1}{4}$  tons has recently been announced by the Stewart Motor Corp. It is equipped with the new  $3\frac{5}{8}$  x  $5\frac{1}{8}$  in. Buda engine designed especially for this class of service, and is said to be capable of speeds from 35 to 40 miles per hour. The frame is designed to carry an 8 ft. body. Equipment includes electric starter, electric lights and  $34$  x  $4\frac{1}{2}$  in. non-skid cord tires.

The engine used was described in detail in *AUTOMOTIVE INDUSTRIES* for March 30, 1922. It has a detachable head, hollow crankshaft affording pressure feed to all crankshaft bearings, and is designed to provide water circulation completely around all valves. The head is designed with a ledge projecting beyond the cylinder block to facilitate removal without injury to the head gasket. Pistons are

fitted with three rings above the wristpin and a scraper ring at the base of the skirt. The one-piece oil pan is readily removed without disturbing the bearings which are thus made readily accessible for adjustment. A single plate clutch and three-speed gearset are mounted in unit with the engine or a three point support.

The rear axle is the Clark internal gear drive type used on other Stewart models and has a reduction of  $5\frac{1}{2}$  to 1. All springs are of the semi-elliptic type, those in front measuring  $38\frac{3}{8}$  in. long and those in the rear 50 in. The rear springs are equipped with full length rebound plates, bronze bushings and hardened steel pins.

The steering gear is of the screw and nut type and is provided with adjustable thrust bearings to take up end motion of the screw. The chassis is provided with an Alemite lubricating system.



Chassis plan view of new Stewart "Utility Wagon"



## S. A. E. Summer Meeting

# Measuring the Tendency of Various Fuels to Knock

Relative effectiveness of alcohol, benzol and other substances in preventing detonation are determined by more precise methods than used in earlier tests. Results indicate some conclusions reached by Ricardo are in error. Xylidine effective in small amount.

By Thomas Midgley, Jr., and T. A. Boyd\*

**T**HAT the addition of benzene and other aromatic hydrocarbons to paraffin base gasolines greatly reduces the tendency of these fuels to detonate when used in automobile engines has been known for some time. Also, it is well known that alcohol when blended with a paraffin base gasoline improves the combustion characteristics of the fuel. As the reserves of petroleum in this country become more and more depleted the use of benzol, and particularly of alcohol, in commercial motor fuels will probably become greatly extended.

\*Condensed from a paper presented at the summer meeting of the Society of Automotive Engineers. The authors are connected with the Fuel Section of the General Motors Research Laboratory.

<sup>1</sup>See *Journal of the Society of Automotive Engineers*, January, 1922, p. 7.

Alcohol as produced commercially dissolves in gasoline only to a very small extent; but the addition of a proper percentage of an aromatic hydrocarbon, such as benzol, toluol or xylol, to the mixture renders the ingredients completely miscible.

The object of this paper is to report the progress that has been made in measuring the detonating tendencies of mixtures of some of the principal materials that are used as components of the blended motor fuels now available commercially. Although these data are incomplete and have not been obtained in such a form as to be universally usable, it was thought advisable to present some of them in this way, especially in view of the fact that a considerable amount of the matter dealing with this subject that has been published in the past is in error. As examples of this the following statements by Ricardo may be cited:

- (1) Xylene is inferior to toluene for the suppression of detonation
- (2) The detonation point of mixtures of ethyl alcohol, acetone, toluene and xylene with paraffin and other hydrocarbons, follows a straight law when the mixture is apportioned by weight and not by volume; that is, the addition of 40 per cent by weight of, say, toluene to hexane would raise the detonation point exactly four times as much as the addition of 10 per cent

The primary reason for the unreliability of some of the data on blending characteristics that have been obtained and published is the previous lack of a means for measuring the detonating tendencies of fuels with sufficient accuracy. The use of the bouncing-pin method for the measurement of the intensity of detonation, however, gives results that are reliable and have a high degree of accuracy. This instrumentation, which is illustrated in Fig. 1 and was described in our paper entitled *Methods of Measuring Detonation in Engines*<sup>1</sup> has made it possible to secure the data that are presented in this paper.

In order that the effects of blending materials might be measured in as wide a range of concentrations as practicable, they were blended with kerosene for making the majority of the determinations reported in this paper.

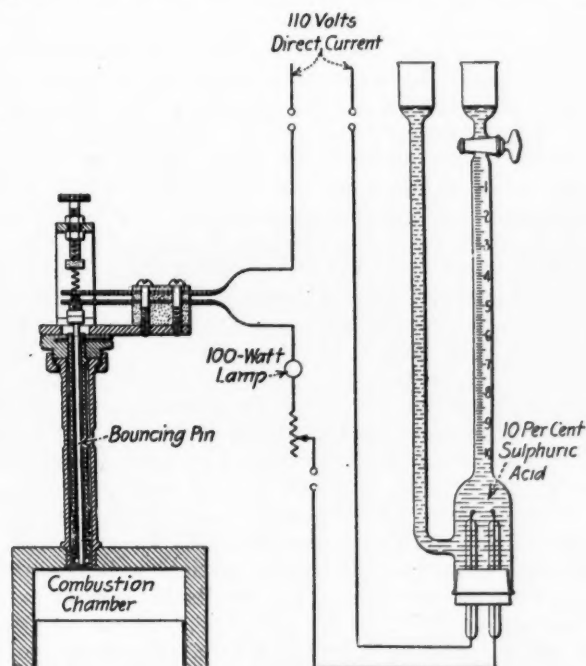


Fig. 1—Arrangement of apparatus for measuring detonation by the bouncing-pin method

The greater tendency of kerosene than lighter paraffin hydrocarbons to detonate made it possible to determine the detonation characteristics of blends up to a concentration of 80 per cent benzol or 50 per cent alcohol without introducing the difficulties incident to excessively high engine compression. The curves of Fig. 2 show that in general the characteristics of gasoline blends follow closely those of kerosene. This agreement is still better on the molecular basis. So that results obtained from a given concentration of blending material in kerosene are applicable within fairly close limits to blends of similar compositions in which the kerosene has been replaced by a gasoline.

On account of variations in engine conditions it is evident that data obtained from any particular engine are applicable in a quantitative way only to that one design and set of conditions. But, although widely different behavior may characterize the combustion of a certain fuel in two different engines, the relative behaviors of two given fuels will be comparative in whatever type of engine they may be run. Hence, in measuring the detonating tendency of any fuel it is essential that some standard be used as a basis of comparison. In the tests reported herein small percentages of xylidine in the same paraffin fuel that was used for blending with the alcohol and with the aromatic hydrocarbons were employed as a standard. Xylidine has the property, common to aromatic amines and considerably more marked in a number of other materials, of exerting a powerful suppressing action on detonation, when present in a fuel in percentages that are relatively very small. Thus, it may be seen from Fig. 2 that 1 per cent of xylidine in kerosene is equivalent for the elimination of detonation to about 15 per cent of benzene in the same material. This property of xylidine makes it possible to convert kerosene into a fuel that will withstand very high compressions without knocking, and with the addition of such a small percentage of xylidine that the combustion characteristics of the kerosene, other than its tendency to detonate, are not materially changed.

#### Properties of Materials Used as Fuels

The materials used as ingredients of the various fuels that were either examined or employed as standards in the examinations, the results of which are reported in this paper, were "high-test" gasoline, commercial gasoline, kerosene, xylidine, benzene, or 90-deg. benzol, toluene, xylene and alcohol. The xylidine employed was a commercial material composed of the mixed xylidines. The alcohol used was absolute ethyl. The use of absolute rather than commercial denatured alcohol in these tests was necessary on account of the almost complete insolubility of the latter in paraffin oils, unless a "binder" such as benzol is used. Some physical properties of the other materials included in this list are presented in Table 1.

A  $\frac{3}{4}$ -kw. Delco-Light engine was used for making all the determinations. This is a single-cylinder, air-cooled engine, direct-connected to a 32-volt, direct current generator, and having a  $2\frac{1}{2}$ -in. bore and a 5-in. stroke. The engine was standard, except that a means was provided for adjusting the spark timing, and that the compression was increased by stages from the normal ratio of 3.47 to 1 to a ratio of 5.36 to 1. This was done by a series of cylinder heads that had been cut down by different amounts, so as to reduce the clearance volume by corresponding stages.

The method used in making the determinations can best be explained by giving a specific example, for which the comparison of a blend containing 45 per cent of benzol and 55 per cent of kerosene with fuels composed

TABLE 1—PHYSICAL DATA ON THE FUELS USED IN THE TESTS

Hydrocarbon	Kerosene	Commer- cial	"High- Test"	Benzene, 90-Deg.	Toluene	Xylene
Specific Gravity at 15 Deg. Cent. (59 Deg. Fahr.)	0.816	0.734	0.704	0.878	0.860*	0.860*
Absorption in Cold Sulphuric Acid, per cent.	7	5	3	....	....	....
Distillation Temperatures First Drop,						
Deg. Cent.	186.0	40.0	44.0	74.0	107.0	135.0
Deg. Fahr.	366.8	104.0	111.2	165.2	224.6	275.0
10 Per Cent,						
Deg. Cent.	201.0	65.0	59.0	77.5	108.0	136.0
Deg. Fahr.	393.8	149.0	138.2	171.5	226.4	276.8
20 Per Cent,						
Deg. Cent.	207.0	83.5	68.5	78.7	108.5	136.2
Deg. Fahr.	404.6	182.3	155.3	173.7	227.3	277.2
30 Per Cent,						
Deg. Cent.	212.0	99.0	76.0	79.2	108.6	136.5
Deg. Fahr.	413.6	210.2	168.8	174.6	227.5	277.7
40 Per Cent,						
Deg. Cent.	217.5	111.5	82.7	79.8	108.7	136.7
Deg. Fahr.	423.5	232.7	180.9	175.6	227.7	278.1
50 Per Cent,						
Deg. Cent.	222.0	125.0	89.3	80.1	108.8	136.9
Deg. Fahr.	431.6	257.0	192.7	176.2	227.8	278.4
60 Per Cent,						
Deg. Cent.	227.5	140.0	96.0	80.5	108.8	137.1
Deg. Fahr.	441.5	284.0	204.8	176.9	227.8	278.8
70 Per Cent,						
Deg. Cent.	233.5	157.5	103.0	81.1	108.8	137.3
Deg. Fahr.	452.3	315.5	217.4	178.0	227.8	279.1
80 Per Cent,						
Deg. Cent.	241.0	177.0	114.0	82.0	108.9	137.5
Deg. Fahr.	465.8	350.6	237.2	179.6	228.0	279.5
90 Per Cent,						
Deg. Cent.	253.5	200.0	128.0	85.0	109.0	137.8
Deg. Fahr.	488.3	392.0	262.4	185.0	228.2	280.0
95 Per Cent,						
Deg. Cent.	268.0	219.0	157.0	92.5	109.2	138.1
Deg. Fahr.	514.4	426.2	314.6	198.5	228.6	280.6
Dry,						
Deg. Cent.	291.0	226.0	178.0	....	....	....
Deg. Fahr.	555.8	438.8	352.4	....	....	....

\*Approximate.

of small percentages of xylidine in kerosene was employed. A compression ratio of 3.87 to 1 was used, so that some detonation would occur, but which was not so violent as to cut down the power of the engine seriously or to cause it to operate in an erratic manner. The fuel under examination was put into one side of the fuel system and the mixing valve on the engine was adjusted so as to give a maximum of detonation. This adjustment produces close to the leanest possible mixture for maximum power. By trial it was found that 5 per cent of xylidine in kerosene had a slightly less detonating tendency than the benzene-kerosene blend under examination. This fuel was then placed in the other side of the fuel system and its level was adjusted so as to give the point of maximum detonation. The setting of the mixing valve was left undisturbed throughout the determination so that the compression pressure of the engine would be unchanged. A number of alternate 1-min. runs were then made, with the 5 per cent xylidine-in-kerosene and the benzene-kerosene blend. The amount of gas evolved in the electrolytic cell during each period was recorded. The output of the generator in volts and amperes was also kept as a matter of record. After three to six runs had been made with each fuel, the benzene-kerosene blend was replaced with 4 per cent of xylidine in kerosene and a second series of runs was made in the same manner. The amounts of gas evolved during the 1-min. runs were then averaged, and the values thus obtained for the xylidine-kerosene fuels were plotted on a coordinate chart having as its vertical axis the amount of gas evolved per minute and as its horizontal axis the percentage of xylidine in kerosene. These two points were next joined by a straight line. From the point at which this line crossed the horizontal line corresponding to the volume of gas evolved by the benzene-kerosene fuel under examination, a vertical projection was made to the



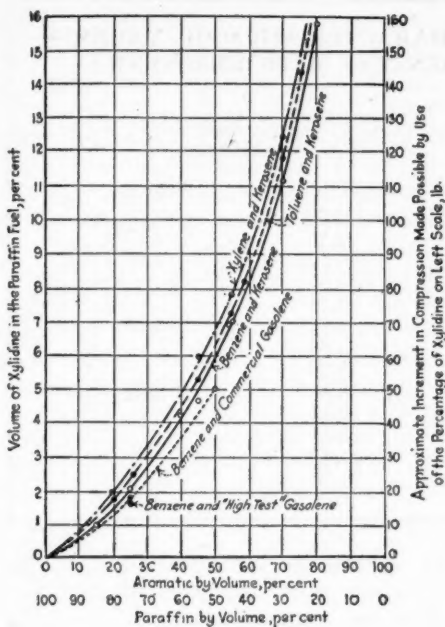


Fig. 2—Graphical arrangement of the data obtained in determining the detonation characteristics of blends of aromatic and paraffin hydrocarbons

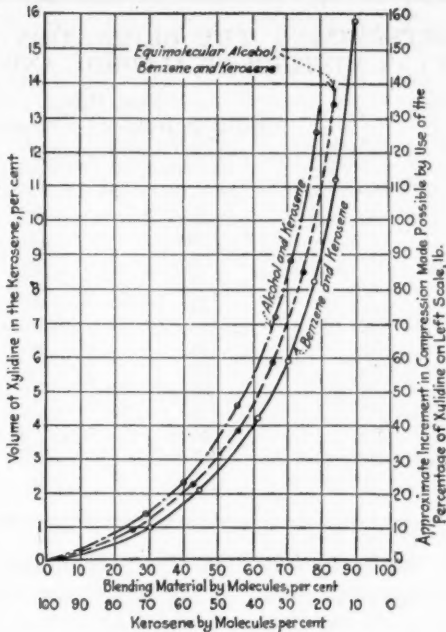


Fig. 3—Chart showing the effects on the detonation characteristics of kerosene of blending with it various percentages of alcohol and benzene

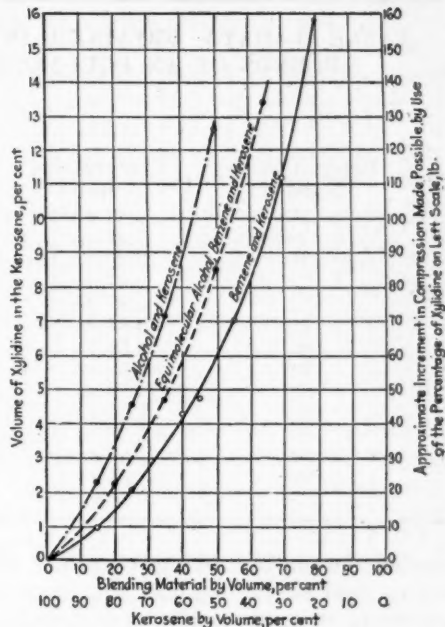


Fig. 5—Chart showing the effects on the detonation characteristics of kerosene of blending with it various molecular percentages of alcohol and benzene

horizontal scale at the bottom of the chart giving the percentage of xylidine in kerosene. The intersection of this projected line with the bottom scale then gave directly the percentage of xylidine in kerosene that was equivalent in its effect for the suppression of detonation to 45 per cent of benzene in kerosene.

### Results

The data obtained in the tests on which this paper is based are given in Tables 2 and 3. The averages of the results given in these tables have been used in plotting the curves, Fig. 3. Attention is called to the consistency of the data, and to the agreement between the results obtained with like concentrations of given materials. The close checks indicate a high degree of accuracy.

From Fig. 2 the rapidly increasing slope of the curves as the percentage of the aromatic constituent is raised may be noted. Thus the curves show that the presence of only a small percentage of an aromatic hydrocarbon in a paraffin fuel has but a slight effect toward suppressing detonation. This is in agreement with the practical observation made by those who have used benzol-gasoline

line blends that the addition of less than 20 per cent of benzol to a commercial gasoline or a naphtha exerts only a small influence toward causing the engine to give smoother operation. But when benzol is blended with paraffin fuels in larger percentages its effect increases rapidly as its concentration relative to the paraffin fuel is raised. This is due, in part at least, to the greater percentage of reduction in the amount of the paraffin constituent present as the aromatic content of the blend is increased. It will also be observed from Fig. 2 that toluene on the basis of volume is more effective than benzol for eliminating detonation conditions, and that xylene is, in turn, still more effective than toluene for this purpose.

The vertical scale at the right of Fig. 2 shows approximately the increments in compression pressure of the engine that are made possible by the addition to a paraffin fuel of the corresponding percentages of xylidine given on the vertical scales to the left. From the two scales on the charts it will be observed that the addition of 1 per cent of xylidine to a fuel that gives incipient detonation in a certain engine makes it possible to raise the compression of the engine about 10 lb., without any

TABLE 2—DATA OBTAINED IN DETERMINING THE DETONATION CHARACTERISTICS OF VARIOUS BLENDS OF ALCOHOL AND KEROSENE

Determination Number	Compression-Ratio	Spark, Deg. Before Top Center	Alcohol by Vol. per cent	Kerosene by Vol. per cent	Determined Equivalent Xylidine in Kerosene by Volume, per cent Individual	Average
74	3.47 to 1	43	15	85	2.25	
75	3.47 to 1	43	15	85	2.30	
76	3.47 to 1	43	15	85	2.40	2.30
68	3.87 to 1	32	25	75	4.60	
69	3.87 to 1	32	25	75	4.60	
70	3.87 to 1	32	25	75	4.60	4.60
53	4.59 to 1	32	35	65	7.40	
54	4.59 to 1	32	35	65	7.15	
55	4.59 to 1	32	35	65	7.00	
56	4.59 to 1	32	35	65	7.10	7.20
50	5.36 to 1	25	50	50	12.40	
51	5.36 to 1	25	50	50	12.70	
52	5.36 to 1	25	50	50	12.80	12.60

TABLE 3—DATA OBTAINED IN DETERMINING THE DETONATION CHARACTERISTICS OF VARIOUS BLENDS OF AN EQUI-MOLECULAR MIXTURE OF ALCOHOL AND BENZENE WITH KEROSENE

Determination Number	Compression-Ratio	Spark, Deg. Before Top Center	Fuel Blend		Determined Equivalent Xylidine in Kerosene, by Vol., per cent	
			Equi-molecular Alcohol and Benzene, by Vol., per cent	Kerosene, by Vol., per cent	Individual	Average
77	3.47 to 1	43	20	80	2.35	
78	3.47 to 1	43	20	80	2.25	
79	3.47 to 1	43	20	80	2.15	2.25
71	3.87 to 1	32	35	65	4.65	
72	3.87 to 1	32	35	65	4.75	
73	3.87 to 1	32	35	65	4.75	4.75
80	4.59 to 1	32	50	50	8.60	
81	4.59 to 1	32	50	50	8.20	
82	4.59 to 1	32	50	50	8.60	8.50
84	5.36 to 1	25	65	35	13.15	
86	5.36 to 1	25	65	35	13.55	
87	5.36 to 1	25	65	35	13.45	
88	5.36 to 1	25	65	35	13.30	13.40

greater detonation being obtained than with the untreated fuel at the original and lower compression. The increment in compression made possible by each per cent of xylidine added to the fuel can only be approximated, but the values given are based upon a number of observations made under practical operating conditions, on engines ranging from the single-cylinder Delco-Light to the 12-cylinder Liberty, over a compression range of from 50 to 160 lb. By referring the curves given on the charts to the scales at the right, an approximation may be obtained of the relative composition necessary to give smooth operation at a corresponding increase above the normal limiting or critical compression of the paraffin fuel alone.

The data in Tables 2 and 3, together with the benzol-kerosene curve of Fig. 2, are arranged graphically in Fig. 3. This chart shows to a good advantage the relation between the effectiveness of alcohol and that of benzol for the suppression of detonation when blended with a paraffin fuel. It will be observed that on the volume basis alcohol is considerably more effective than benzol for this purpose. Thus, from the chart, 35 per cent of alcohol blended with kerosene produces an effect in suppressing the detonating tendency of the fuel equal to that given by 55 per cent of benzol blended with the same material.

The middle curve of Fig. 3 is plotted from data obtained in determining the effect of blending an equi-molecular mixture of alcohol and benzene with kerosene

in the percentages by volume as indicated in Table 3. This equi-molecular mixture was composed of 39.2 per cent of alcohol and 60.8 per cent of benzol by volume. A given volume of the alcohol-benzol mixture contained, of course, equal amounts of alcohol and benzene on the

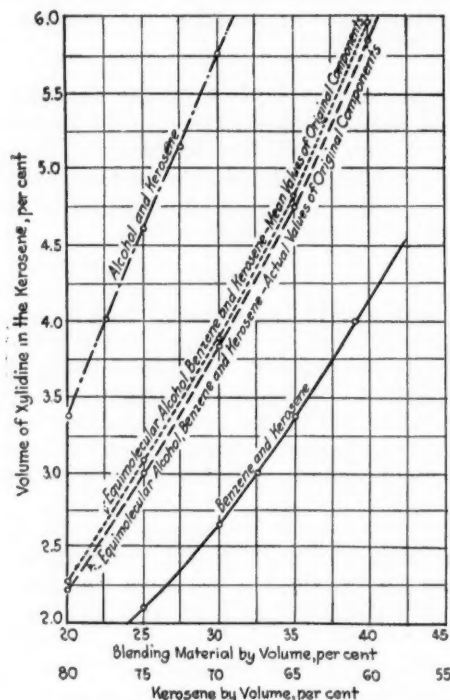


Fig. 4—A blend of two fuels sometimes has a greater tendency to detonate than is indicated by a mean of the values of its components

TABLE 4—A COMPILATION OF DATA BASED ON FIG. 3 AND ILLUSTRATING THE OBSERVATION THAT A BLEND OF TWO FUELS SOMETIMES HAS A GREATER TENDENCY TO DETONATE THAN IS INDICATED BY THE CHARACTERISTICS OF ITS COMPONENTS

(1) Blending Material in Fuel on the Basis of Volume, per cent	20	30	40	50
(2) Excess Effect of Alcohol over Benzene in Equivalent Percentage of Xylidine	1.900	3.050	4.650	6.650
Excess Effect of Alcohol-Benzene Mixture over Benzene in Equivalent Percentage of Xylidine				
(3) Actual Value	0.700	1.150	1.700	2.550
(4) Mean Value of Components	0.750	1.200	1.820	2.600
(5) Ratio of Value in Item 2 to That in Item 3	0.369	0.377	0.366	0.384

molecular basis. Thus, 100 cc. of the mixture contained 0.675 gram molecules of each of the ingredients, alcohol and benzene. The curve of the detonation characteristics of the fuel obtained by blending this mixture with kerosene should lie somewhere between the curves obtained in a similar way when using alcohol-kerosene and benzol-kerosene blends, respectively. Since the alcohol-benzol mixture contained 39.2 per cent of alcohol and 60.8 per cent of benzol by volume, it is natural to suppose that for a given concentration of this mixture in kerosene the point representing the detonation value of the blend should lie above the benzol-kerosene curve a distance equal to 0.392 part of the differential between



similar points on the benzol-kerosene and the alcohol-kerosene curves. Because they are of such small magnitude no account has been taken here of the changes in volume that occur when some of these materials are blended. In making the mixtures used in the tests, each ingredient was measured separately; that is, before being blended. But, while the actual points lie very close to this mean value, it is significant that in every case they are below it. This statement is illustrated by the curves of Fig. 4 and by the data presented in Table 4. The values given in the first three items of Table 4 were taken directly from the curves of Fig. 3, and those in Item 4 were obtained by multiplying the corresponding values in Item 2 by 0.392. The curves in Fig. 4 are based on those in Fig. 3 and on the figures in Table 4.

It appears, then, that the mixture obtained by blending two fuels of definite detonation characteristics sometimes has a greater detonating tendency than is indicated by the arithmetical mean between the components on the basis of the percentage in which each is present. The authors have previously called attention to the fact that in some cases two fuels of similar detonation characteristics, upon being blended, give a fuel that has a very much greater tendency to detonate than either of the ingredients. The results obtained in the tests reported in this paper appear to indicate that this characteristic is common to blended fuels; that is, the detonating tendency of a fuel composed of two ingredients is greater than the average of the values representing the detonating tendencies of the two components taken

separately. But this is a point that has not yet been determined accurately for a wide range of different materials.

On the molecular basis there is not such a marked difference between the effectiveness of alcohol and that of benzol for suppressing detonation as shown in Fig. 5 as there is on the volume basis as indicated in Fig. 3. The closer agreement between the effects of the two materials on the basis of molecular concentration is due to the smaller size of the alcohol molecule as compared with that of the benzol molecule. But even on this basis alcohol is still more effective than benzol for suppressing detonation. Thirty-five per cent of alcohol, which, as is indicated above, is equivalent in effect to 55 per cent of benzol on the volume basis, is equivalent to 42 per cent of benzol on the molecular basis.

Since the middle curve in Fig. 5 is based on the results obtained by blending an equi-molecular mixture of alcohol and benzol with kerosene, it is natural to suppose that any point on it should lie half-way between the points occupying like positions on the two outside curves, which were obtained by blending alcohol and benzol separately with kerosene. However, the points on the middle curve do not occupy this middle position; but, as is the case on the volume basis, as shown in Table 4 and Fig. 4, they are uniformly lower than the mean values of the original components, thus showing that in this case a blend of the two ingredients is not so effective for the suppression of detonation as the mean average of the effects of the ingredients would indicate.

## Heat Treatment of Steel Forgings

IN a paper on Drop Forging Practice presented at the annual meeting of the S.A.E. last winter J. H. Nelson of the Wyman & Gordon Co., gave chemical analysis and physical tests of 107 different melts of plain carbon steel purchased from different mills and fairly representative of the steels used for automobile drop forgings. A tensile test specimen is machined up from an extension or coupon forged on the end of every crankshaft, and which remains on the crankshaft throughout the various heat treatments, to act as a check of these treatments.

The crankshafts were all quenched in water from 1525 deg. Fahr. and drawn back to various temperatures. The heat treatments are intended to give physical properties which will meet the following specifications: Tensile strength, 100,000 lbs. p. sq. in.; elastic limit, 70,000 lbs. p. sq. in.; elongation in 2 in., 18 per cent; reduction of area, 50 per cent; Brinell hardness, 228 to 248. In the following table the averages of the results with any particular steel and heat treatment are given. It will be noticed that the various steels require drawing temperatures ranging from 980 to 1120 deg. Fahr. to bring them within the limits specified. It is concluded from the re-

sults that the chemical composition of the steel is not a sufficient criterion to enable any person to prescribe heat treatments with any degree of accuracy, and that the only safe way to determine this is by actual experimentation for each melt of steel used. Following is a summary of the conclusions reached:

1. Steels of the same grade and of the same chemical composition do not respond in the same way to heat-treatment.
2. To heat-treat with minimum loss, only steels from the same melt should be included in a furnace charge.
3. Stock subjected to heat-treatment should be carefully segregated into piles of the same melt; it should be kept segregated throughout the entire process of fabrication to produce satisfactory forgings of uniform quality.
4. Tensile and hardness tests should be required on all heat-treated forgings to check the thoroughness with which the various heat-treatment operations were performed.
5. At least one hardness test should be made on all heat-treated forgings to insure that all have responded to the heat-treatment operations in the same manner.

Table 1—Averages of Test Results

Group	Drawing Temperature deg. fahr.	C 0.400 to 0.500	Mn 0.600 to 0.800	P 0.045 max.	S 0.050 max.	Yield-Point, lb. per sq. in.	Tensile-Strength, lb. per sq. in.	Elongation in 2 In., per cent	Reduction of Area, per cent	Brinell Hardness No.	Number of Tests Averaged
A	980	0.430	0.650	0.012	0.043	74,280	111,220	20.1	51.3	238	60
B	1,000	0.430	0.690	0.016	0.041	77,540	115,900	20.8	52.8	238	110
C	1,020	0.470	0.690	0.018	0.041	77,300	115,950	21.6	53.6	236	90
D	1,040	0.470	0.730	0.021	0.044	77,500	115,750	21.3	52.9	238	230
E	1,060	0.460	0.710	0.024	0.042	77,420	114,980	21.6	54.3	238	120
F	1,080	0.460	0.710	0.028	0.046	79,100	117,200	20.8	53.1	240	170
G	1,100	0.450	0.750	0.021	0.042	76,900	114,600	22.1	55.2	241	110
H	1,120	0.450	0.770	0.032	0.044	78,500	115,750	21.7	56.0	243	190

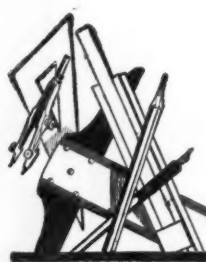
## Exports of Passenger Cars, Trucks, Tires, Tractors,

COUNTRIES	GASOLINE PASSENGER CARS						GASOLINE TRUCKS						PARTS		ELECTRIC PASSENGER CARS AND TRUCKS	
	Up to \$800		\$800 to \$2000		\$2000 and over		Up to 1 ton incl.		Over 1 to 2½ tons		Over 2½ tons					
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value	No.	Value	
Europe																
Azores and Madeira Islands																\$160
Belgium	348	\$117,352	25	\$28,495	1	\$2,200	157	\$41,323	1	\$3,000						30,149
Bulgaria																109
Czechoslovakia																4
Denmark	15	9,918	33	31,474												216,883
Estonia																1,311
Finland							1	800								129,365
France	44	21,856	6	9,550	8	59,350			2	3,240					1	\$4,072
Germany	4	1,741	1	1,200			2	849	1	1,800						1,731
Gibraltar			1	1,549												
Greece	23	12,038	3	3,723			1	404								3,137
Iceland and Faroe Islands																187
Italy			2	2,457	1	3,000										4,320
Latvia	1	435	2	2,000					1	425	5	17,000				379
Malta, Gozo and Cyprus Islands	2	826														1,041
Netherlands	35	20,765	31	30,403	8	25,192										7,529
Norway	188	59,109	48	46,474	1	2,500	71	21,506	11	8,897						14,532
Poland and Danzig																28
Portugal	2	888	10	11,110												2,518
Roumania	5	1,792			2	8,000										513
Russia in Europe																429
Spain	46	27,657	108	126,885	18	53,094	40	10,528	1	2,079	2	\$4,133			1	200,154
Sweden	176	88,105	189	208,966	1	2,412	40	14,620								13,763
Switzerland			45	43,434	1	3,500										1,033
Turkey in Europe	12	4,475					6	2,128								3,981
Ukraine			10	11,000	3	7,650										625
England	167	116,430	70	78,941	4	18,744	1	1,032	1	1,080						473,764
Scotland	6	4,390	4	3,585												811
Ireland	11	4,717														7,374
Yugoslavia, Albania, etc.																1,153
North and South America																
British Honduras	2	670														390
Canada	640	378,274	778	943,924	83	234,256	47	36,731	97	113,350	52	116,846			1	1,946,003
Costa Rica	5	3,496														940
Guatemala	1	565	3	3,121												1,856
Honduras	3	1,098					2	545	1	3,935						1,893
Nicaragua																250
Panama	12	6,699	4	4,598												4,885
Salvador			8	11,387												2,084
Mexico	428	201,315	131	142,542	16	50,297	36	11,507	22	20,377	1	4,751			1	60,041
Newfoundland and Labrador			2	3,475												875
Barbados	1	200							1	2,500						3,632
Jamaica	13	7,266	7	9,050	3	6,615	15	6,197	1	1,610						3,179
Trinidad and Tobago	17	7,382	2	1,800			10	4,040								9,346
Other British West Indies	7	2,356	1	1,595	1	3,500	12	4,899								3,445
Cuba	127	56,250	38	48,607	8	26,443	12	4,081	2	3,634	1	2,835				2,037
Dominican Republic	6	2,333	1	1,391												83,612
Dutch West Indies	6	2,440														3,291
French West Indies							1	414								1,152
Haiti	2	1,448														925
Virgin Islands of U. S.	1	367														2,827
Argentina	26	13,250	85	90,168	18	57,638			1	2,108						1,073
Bolivia																293,423
Brazil	12	8,544	37	40,868	3	11,500										631
Chile							9	3,762								43,502
Colombia	4	1,592	2	2,222												8,190
Ecuador	6	4,506	4	4,171												3,702
British Guiana																764
Dutch Guiana	4	1,820														905
French Guiana																2,668
Paraguay																45
Peru			1	990			15	6,060								8,777
Uruguay	40	13,830	1	1,323	2	7,000	10	2,632								19,996
Venezuela	23	10,619	6	8,064	4	13,384	5	2,041								8,927
Asia																
Aden																350
Armenia and Kurdistan	5	1,750					4	2,803								
Ceylon	11	7,369														638
China	42	25,365	26	25,950	1	2,500	3	2,274	7	3,430						9,388
Chosen																
British India	22	14,301	7	11,148	1	2,200	6	6,277	3	4,860						20,527
Straits Settlements			4	4,656												7,581
Other British East Indies																53
Other Dutch East Indies			1	1,329					3	3,089						1,339
Java and Madura	2	1,500	18	25,036	3	9,916										11,343
French Indo-China																2,290
Hejaz, Arabia and Mesopotamia																3,670
Far Eastern Republic																260
Hongkong			1	1,150	2	8,000			1	1,910	3	5,500				1,414
Japan	108	43,681	7	9,485	1	3,600	50	25,980	2	3,817	4	8,687			12	41,376
Palestine and Syria	81	34,372	7	7,724												8,038
Persia	1	513														430
Philippine Islands	48	26,125	4	6,940	2	4,697										24,357
Greece in Asia																
Siam	3	2,172	6	6,058												401
Oceania																
Australia	1,130	234,093	319	325,301	6	13,510	10	13,526	63	81,159	5	6,633			1	104,394
New Zealand	26	18,207	44	49,165	1	3,500	2	2,616	2	3,996						14,967
Other British Oceania																264
French Oceania																292
Other Oceania	1	755														208
Africa																
Algeria and Tunis	6	2,782														
British West Africa	1	755	5	5,306	1	2,238										11,450
British South Africa	36	24,327	51	54,888												10,564
British East Africa	1	250	3	4,000												494
Canary Islands	2	1,210							2	3,611						856
French Africa	1	425														2,371
Egypt	24	11,468	3	5,000			3	1,244								12,304
Morocco																126
Portuguese Africa	1	663					9	3,636								
Portuguese East Africa			2	1,996												386
	4,023	\$1,670,897	2,211	\$2,506,904	204	\$645,536	580	\$234,455	226	\$273,907	73	\$166,385	\$3,933,488	20	\$35,791	



## Motorcycles and Aircraft for April, 1922

TIRES						FARM TRACTORS		PARTS	MOTORCYCLES		AIRPLANES AND SEA-PLANES		PARTS	COUNTRIES
Casings		Inner		Solid		No.	Value	Value	No.	Value	No.	Value	Value	
No.	Value	No.	Value	No.	Value									
334	\$6,009	200	\$418			1	\$304	\$527	156	\$43,328				Europe
276	4,919					1	385		1	375				Azores and Madeira Islands
4,967	77,287	1,522	3,172	4	\$150			1,691	38	9,185				Belgium
316	7,011	230	579					242	10	2,634				Czechoslovakia
1,144	23,536	5	15			10	4,138	700	80	13,244			\$300	Denmark
5	300								5	1,398				Estonia
54	610					3	2,192							Finland
48	689	46	75											France
106	1,680	82	150					407	85	23,202				Germany
822	12,761	506	970			1	385	98						Gibraltar
9	153	12	23						2	350				Greece
384	4,071	20	39	8	250			78	215	62,489				Iceland and Faroe Islands
1,224	20,973	340	810	44	1,156				59	14,689	1	\$3,000		Italy
4,474	91,345	2,005	5,559	22	997			2,996						Latvia
1,013	17,220	359	785						25	7,338				Malta, Gozo and Cyprus Islands
						14	56,014	20,567	1	308				Netherlands
1,857	45,995	2,684	5,495	310	5,893	46	17,375	565	141	37,902				Norway
4,040	68,725	2,210	4,951	104	2,043			412	38	6,109				Poland and Danzig
183	3,135	91	169	4	64				22	5,931				Portugal
170	1,865	218	368					590						Roumania
140	2,000													Spain
25,099	247,394	7,668	17,899	479	9,784	3	1,298	2,875	41	11,544			300	Sweden
169	1,862	100	144											Switzerland
157	1,026	115	256					10,833	1	100				Turkey in Europe
370	6,008	436	928											Ukraine
24	259													England
6,244	92,752	10,856	23,250	270	10,782	2,798	312,793	50,791	101	27,463			226	Scotland
63	1,058	73	166						1	75				Ireland
103	2,042	70	184	2	68	1	3,341	1,276						Yugoslavia, Albania, etc.
44	987	50	144	6	213									North and South America
52	1,111	65	124											British Honduras
780	11,510	698	1,308	30	454			39	2	974				Canada
401	4,724	396	611	26	538	7	4,405	12,970	7	2,027			150	Costa Rica
2,738	46,353	5,566	11,669	1,704	25,792			89						Guatemala
515	7,520	607	1,158	2	45			64						Honduras
45	525	57	117											Nicaragua
321	4,237	201	355	46	1,181				2	550				Panama
379	5,659	379	1,025	18	182									Salvador
13	215	20	36											Mexico
7,686	100,198	7,015	11,730	207	6,817			56						Newfoundland and Labrador
279	2,909	82	239					282						Barbados
110	1,274	54	131											Jamaica
379	4,498	98	187	88	1,855			121						Trinidad and Tobago
118	1,673	103	217											Other British West Indies
41	366	42	76											Cuba
5,899	81,595	8,685	10,534	8	198	123	59,229	1,233	10	2,582			50	Dominican Republic
								5,775						Dutch West Indies
3,511	37,124	4,686	4,765	76	1,952	30	10,937	964	10	2,905				French West Indies
515	7,662	409	996	2	104			613						Haiti
428	6,223	340	1,044	2	42	5	15,300	1,258						Virgin Islands of U. S.
55	749	50	85			4	1,988							Argentina
88	1,203			12	178	2	650	50						Bolivia
33	196	36	61											Brazil
2	62													Chile
968	15,349	472	1,083	20	1,077	1	593	815						Colombia
1,574	18,000	1,160	1,626			40	14,584							Ecuador
1,269	21,145	1,336	2,589					11,577	2	468				British Guiana
88	882	48	75											Dutch Guiana
65	785	20	37			11	4,905	443						French Guiana
646	10,078	327	633	58	1,225									Paraguay
219	1,900	207	609											Peru
567	6,224	451	1,589	110	2,781									Uruguay
599	5,214	139	368	6	144									Venezuela
														Asia
605	11,664	70	210	34	705			1,562						Aden
30	210	30	60											Armenia and Kurdistan
10	108	12	18											Ceylon
30	882													China
1,185	17,142			28	538	2	686	90	75	21,915				Chosen
587	6,822	364	785			3	939							British India
3,054	40,689	1,487	3,267	108	2,481			679						Straits Settlements
18	486	34	102			1	385							Other British East Indies
1,703	30,549	1,577	3,100	301	8,862	6	5,558	1,601	70	19,065				Other Dutch East Indies
3,148	50,602	2,777	5,764	294	10,173			196	31	8,259				Java and Madura
16	181	28	76											French Indo China
35	525	41	76											Hejaz, Arabia and Mesopotamia
4	77	6	15											Far Eastern Republic
														Hongkong
944	20,271	1,220	4,194											Japan
2,039	27,393	1,132	2,203	24	690									Palestine and Syria
465	5,207	70	122											Persia
187	2,922	45	150											Philippine Islands
29	698													Greece in Asia
751	7,020	636	3,664	32	1,225	5	1,822	779						Siam
														Oceania
														Australia
														New Zealand
														Other British Oceania
														French Oceania
														Other Oceania
														Africa
														Algeria and Tunis
														British West Africa
														British South Africa
														British East Africa
														Canary Islands
														French Africa
														Egypt
														Morocco
														Portuguese Africa
														Portuguese East Africa
99,062	\$1,374,343	73,176	\$154,422	4,489	\$100,639	3,121	\$537,396	\$148,723	1,248	\$332,215	1	\$3,000	\$1,412	



# The FORUM



## Changes in Design Make Foreign Service Difficult

*Service and Sales Conditions in China. Orientals Like Magneto-Equipped Cars. Clearly Written Parts Books Are Essential.*

Editor, AUTOMOTIVE INDUSTRIES:

I desire to express some views regarding ways in which manufacturers could facilitate overseas service, gleaned through three years of experience in China and the Philippines.

Omitting the element of time, Chinese mechanics are most satisfactory. Put a car which is new to them in their care for repair and they will spend hours in consultation before taking anything apart; but when repaired and assembled, parts will be in place and lock washers and cotter pins will not be forgotten. I have seen old cars sold for new after having been overhauled and refinished by Chinese workmen, and only an expert could distinguish between the old and the new.

Service facilities in China can easily keep pace with increasing demand for automobiles, as growth of the automobile business in China will necessarily be slow because of the scarcity of roads there and the bad condition of most of the existing roads.

In the center and south of China there is very little wheeled traffic except for wheelbarrows, nearly everything is borne on the shoulders of coolies. Heavy carts in the north keep the roads there in nearly impassable condition. Occidentals have built the roads most used by automobiles in the vicinity of treaty ports, and these are well maintained, and are kept free from anything that might puncture tires by the barefoot coolies carrying the human and freight loads through the street.

When an automobile suffers an accident which would ordinarily require floating, and a float cannot be easily obtained, a dozen coolies with bamboo poles and grass rope can easily be found who will carry the car, with a rapid swinging gait, and the while singing some boisterous cant, to the service station.

Service problems are not difficult in China when adequate stocks of spares are obtainable, in view of the grouping of most of the cars in large cities and the low salaries paid to competent native workmen. Undoubt-

edly road building will extend from these cities and existing service facilities can be expanded and branches established in the provinces even more rapidly than the increased demand created by road building will necessitate.

The greatest obstacle met in overseas service is caused by the frequent change in design and equipment, especially the latter. Generally, the dealers are obliged to service all the accessories supplied with the cars they sell, and each dealer often handles several makes.

Car owners are not pacified by being told that many different types of speedometer heads and shafts, electrical parts or units, carburetor parts, etc., have been used on cars of the model he owns, and that all types are in stock except the ones he needs. The car owner wants parts to fit his car and is very likely to buy his next car from the company with a reputation for being able to supply spares when needed.

Whatever equipment is furnished with an export job should be retained for at least a year and preferably, from the importer's standpoint, irrespective of improvement, should be standardized throughout the production of that model. Then the distributor could safely stock an adequate supply of spares.

Confusion of policies of automobile manufactures and accessory manufactures is frequently encountered, one referring to the other on export service, and each refusing to sell certain parts or sub-assemblies. Owners complain about being deprived of their cars or some unit thereof for four months or more, this being the time consumed in having certain repairs made at the factories.

Changes in design are frequently made for no apparent reason; in one case a manufacturer of a six-cylinder car brought out a four, the engines of both being made in their own works, the six has a very satisfactory oil gage, but the four has a different and troublesome one; the parts of the six could have been used in place of the

*A FEW weeks ago we published some pictures of Chinese service stations which H. A. Trussell, the writer of the accompanying letter, felt were not properly representative of the kind of service American cars might expect in the Orient.*

*Since Mr. Trussell has had considerable practical experience in selling American cars to China, we asked him if he would write us more fully about his experience, so that various manufacturers in the automotive industry might learn more details about the Chinese market. The following letter is the pleasing result.*

\* \* \*

*You will be interested in the intimate and practical details which are given. "The greatest obstacle met in overseas service," the writer says, for instance, "is caused by the frequent change in design and equipment, especially the latter."*



trouble-making parts of the four with a little forethought in design and without any added cost.

To exhumate the question of whether export machines should be magneto equipped: Greater opposition is met in selling a vehicle without a magneto than in selling one with a left-hand drive. The first questions from a prospective owner are: "What is the mileage per gallon of fuel?" "Is it equipped with a magneto?"

Magneto ignition is preferred because it is independent of a storage battery and more generally satisfactory in service. Modern magnetos are self-contained, simple and more often interchangeable. Much of the dislike for battery ignition distributors could be overcome if they were made interchangeable.

A fleet operator or small dealer can stock one magneto and one extra breaker mechanism to provide for change in direction of rotation, and have a spare ignition system for any of his tractors, trucks or four-cylinder passenger cars which are magneto equipped.

Electrical devices demand more service in the Orient than in our domestic service, due to the hot, humid climate and to the fact that many of the cars are used on islands or at seaports where the ocean breezes must be contended with. And battery service stations with the many loan batteries necessary to service all the different makes of cars are not to be found outside of the larger cities. More than 100 service generator armatures are carried by a distributor in Manila to care for about 1200 cars of a single make in the Philippine Islands.

The people are willing to pay a reasonable extra charge for magneto equipment, and it seems strange that the manufacturers should oppose it so strongly.

I have been in several factories where the feeling seemed to exist that the export business is a necessary evil, and that domestic cars would have to do for export until it reached a certain percentage of their total output. Exported cars are often operated under conditions unknown to this country and it would be a great satisfaction to see American cars meeting them.

Frames and obscured body parts should be better protected and rustproof metal used for fenders, etc., to protect against unfavorable climatic conditions.

I have known rain to fall incessantly for a month in Manila and the rainfall for each of ten consecutive days during this period to exceed the average total rainfall of the United States for an entire year.

One of the oldest American manufacturers, one of the very first to be a big factor in export trade, recently revised their parts books and consolidated all models in a master parts catalogue, which included many changes in part numbers; parts bearing the new numbers came through a month or more ahead of the revised parts books which upon their arrival were found to be printed on paper glazed with some glutinous sizing, with the obvious result that the sheets adhered, and extreme precaution was necessary to preserve at least one of these books.

Parts books, in many cases, seem to just happen; many of them contain erroneous information, omit very important details, lack continuity and do not show the proper relation of various models. With proper forethought one parts book could be used for every model ever built by any one company, excepting fundamental changes in design; slight addenda would be necessary, with the advent of unforeseen development, to care for new models and could be included in a few additional sheets bearing the necessary information regarding technical changes.

Briefly stated, the catalog should be arranged and the parts numbered so that part numbers would indicate the group and approximate relation of the parts,

and the relation of a part to its assembly and the assembly to the whole should suggest an approximate number and indicate its position in the parts book, in the card file and in the stock room. Groups of numbers should be skipped in every assembly and sub-assembly to provide for expansion and addition of equipment, etc.

Part numbers should be retained, any similar part bearing the same number for all models regardless of structural and design changes. Each lot of cars differing from former models should bear a different symbol in a conspicuous place so the owner and operator would be able to tell a parts service salesman all the characteristics of his car by stating a single letter, or any other appropriate symbol, shown on his car.

Each part should have a letter, or appropriate symbol, cast, forged, stamped or painted thereon, corresponding with the symbol borne by the model or lot of cars in which this part was first used. Parts which are difficult to distinguish, such as gears and pinions of various pitch or ratios, should bear the full part number and symbol.

In filling an order for a part, one could, without reference to an index, open the book at nearly the correct page and quickly ascertain the exact part number. Knowing the part number, reference would be made to the price book or appendix, which I choose to have separate from the parts book to encourage frequent revisal to keep the prices on an equitable basis, new price books or sheets to be issued at least as often as new models or series of cars are produced; symbols denoting various models on which different parts were introduced to be shown in connection with the prices; that is, a part bearing a certain number desired for a "C" series car will be found in the proper numerical location in the price book which may show different types of this part to have been first used on "A"- "D"- "G" cars, indicating that an "A" part is used in this connection and showing the current price of same.

Yours very truly,

H. A. TRUSSELL.

## Plowing with Garden Tractors

Editor, AUTOMOTIVE INDUSTRIES:

In your April 23 issue, Mr. Lon R. Smith takes exception to statements contained in my garden tractor article of March 2.

With reference to the plowing ability of the small tractor, it is my humble opinion that undue emphasis has been placed upon this feature in the marketing of garden tractors, and that the importance attached to plowing is an inheritance from the larger tractors which are designed primarily for plowing and are capable of little else. The main usefulness of the small tractor lies in its ability to do work that the larger tractor cannot do—namely, the cultivation of row crops.

The small farmer who does not have a large tractor or other means of plowing is not interested in the garden tractor primarily as an instrument for plowing, for he has plenty of neighbors who do have plowing equipment and are only too glad to do his plowing for him.

Farms are overstocked with plowing equipment now. One cause assigned for the depressed market for farm products which has resulted from surplus production is that every tractor owner has attempted to make the tractor pay for itself by plowing an increased acreage. This condition has created an active demand for cheaper methods of cultivation so that the crops may be marketed at a profit.

FRED C. ZIESENHEIM.

# Lawbreaking Doesn't Settle Labor Troubles

Coal strike reaches critical stages. Both employers and employees have broken the law when they felt strong enough to do so with impunity. Labor unions are autocratic. Many employers are autocratic. Autocracy opposed to cooperation.

By Harry Tipper

**I**N the unfortunate occurrences which have happened at Herrin, Ill., through the complacency of the town and county officials; the inaction of the State and the mistakes of the miners' leaders and the operators, the dangers in the continuance of the coal strike have been brought to the fore again. The fact has become apparent that in a strike of these proportions, under the calm surface, the turmoil is sufficiently seething so that any little thing breaks the surface and causes a violent eruption.

This sort of lawless eruption is not only bad in its effects upon the present strike but is entirely bad in its effect upon the future relations of industry and the way in which the future problems will be considered. This lawlessness is not confined to the unions or the operators. Both sides have broken the law at all times where they have felt sufficiently powerful to do it with impunity. The complacency of the elected public officials of the vicinity and the inactivity of the State officials, are more than serious. Apparently, no punishment is to be visited upon anybody for the Herrin disasters, and no action is to be taken with the officials who are obviously derelict in their duty in permitting the disturbances to exist.

The most disturbing fact in the whole situation is that powerful bodies of men in this country can, within certain localities, disregard the law of the country and base their actions entirely upon their own interests, confident that the officials will excuse the action by cloaking it with a veneer of legality. Not many months ago in West Virginia, we had the spectacle of the coal operators running the county government, paying deputy sheriffs and other people who were supposed to protect the rights of the citizens, and generally supplying all the sinews of war for the government of the localities, and operating this control obviously for their own benefit regardless of the fundamental laws.

The same situation is apparent in the Herrin, Ill., disaster, the only difference being that the leaders and law breakers in this case belong to the employees and not to the employers' ranks. In the Herrin district it so hap-

pened that the union officials and the employees' representatives controlled the elected officers and the political conditions of the neighborhood; consequently, this control has been used to subvert the law for the purposes of the union just as the control in West Virginia was used to subvert the law for the purposes of the employer.

Nothing could illustrate quite so thoroughly the uselessness of attempting to provide an agreement and an orderly organization of industry through the arrangements made

between the union leaders and employer's organizations. Leaders who are incapable themselves of adhering to the laws to which they are subject are equally incapable of standing by an agreement unless it proved to be to their own advantage, and this has been true of the recent history of the organized forces on both sides in the controversy between employers and employees.

The recent history in the actions of labor unions and of employers' groups shows that there is a tendency on both side to over-ride agreements for the observance of law

wherever this is not sufficiently partisan to serve the purposes of the leaders on either side. Primarily, the leaders of the employers' groups do not desire a fair agreement on a fair and reasonable basis, although many individual employers are very anxious to secure such a basis. Similarly, the leaders of the unions are not particularly interested in a fair and just settlement of a case, although a majority of the members of the unions would be satisfied with any agreement approaching such a consideration.

The leaders of these factions are inclined to be more stubborn and fanatical in their approach to the question than the ordinary rank and file on either side.

The experience of supervisors and workers shows amply that the average employer is anxious to give his men fair treatment, and the average employee is anxious to do his bit fairly and honestly. Apparently, in the United States, the fact that individuals are members of an organization for the purpose of furthering some definite ideals, methods or processes, by which improvement may be expected, permits the members of an organization, as members, to en-

**T**HE coal strike affects the automotive industry in more ways than one. It affects the supply of coal needed to keep automotive factories running. And it furnishes an excellent example of the varied interplay of forces which exist in industrial relationships.

\* \* \*

These forces are at work in automotive plants. The relations between employer and employee revolve about the same set of fundamentals throughout the country.

\* \* \*

What do you think about the coal strike?



force attention to the organization by means which, as individuals, they would condemn for their illegality and tyranny.

This is not confined entirely to labor organizations or manufacturers' groups. We have had the same spectacle exhibited by the actions of the Ku Klux Klan, which has evidently regarded itself as above the law, and mentor to the law in some cases.

THE same disregard of fair processes of consideration is to be observed very often in the actions of the labor union and in the actions of the employers' associations. It is this disregard of law by group organizations which distinguishes trade unionism in the United States from the later history of trade unionism in Great Britain, and which makes it impossible for us to consider using trade union machinery if we are to arrive at a peaceful condition in industry and thorough co-operation in the industrial establishment.

The present agitation for the open shop is necessarily corrective to the situation, although a good many of the people who are agitating it are filled with a bitter desire to quash the unions rather than with any real idea of providing an agreement and an improvement. The propa-

ganda which is directed against the unions, and is an attempt to make a closed shop against the unions, is of course dangerous and useless.

But the open shop—the shop which is open to all comers who are skillful regardless of their affiliations in any way whatsoever—is necessary to the proper development of co-operative peace in American industry, and cannot be secured except by making the open shop an example of fair treatment, fair consideration, and ahead of either the union or the ordinary shop in the justice it exacts and considers.

The labor union is autocratic. The average employer is autocratic. Autocratic leadership will not provide a continuous peaceful co-operation.

Meantime, the Government has decided to interfere in the coal strike. The ugly showing of the Herrin circumstances demands the interference of the Government if law and order are to be decently maintained. It is probable that the Government will have to consider the pending railroad strike vote, regardless of whether the Government desires to interfere or not. The conditions obtaining in the mining business and those obtaining in some localities in the railroad business are likely to demand Government interference and action as a natural consequence.

## Organic Accelerators for Vulcanization

THE degree of vulcanization depends upon three factors, viz., the proportional amount of sulphur added to the crude rubber, the temperature at which the reaction is effected and the duration of the reaction.

It is easily understood that the manufacturer is greatly interested in completing this basic operation in a minimum of time. To this end he may act on the first factor, by increasing the proportion of sulphur in the mixture. But for soft rubber articles, which constitute the great majority of rubber products, he cannot exceed 15 to 20 per cent without risking inequality of the vulcanization and without loading the mass with a great excess of sulphur, which, after vulcanization, acts like an inert constituent which is sometimes rather objectionable.

He can also increase the temperature. As a matter of fact, the temperature used has a mean value of 285 to 300 deg. Fahr. and rarely attains 340 deg. As the heat necessary is generally furnished by water vapor (steam) an increase in temperature involves added fuel expense.

The time of the reaction varies in practice between twenty minutes and an hour and a half. It may be even still longer if large masses are being vulcanized, and also in the case of ebonite (hard rubber).

It will be seen from this discussion that the consumption of steam is an item of expense which has an important influence on the manufacturing cost of rubber articles, especially at times when coal is selling at high prices.

For many years there have been known a number of substances possessing the property of accelerating the process of vulcanization. Litharge and calcinated magnesia, when added to the mixture of crude rubber and sulphur, permit of attaining the desired degree of vulcanization in a shorter time and at a saving of 30 to 50 per cent in the consumption of steam, while at the same time increasing the output in the same proportions. These substances, the action of which is as yet little understood, are commonly used by the manufacturers.

Since 1912 new types of accelerators have been discovered, and their number increases from day to day. In some instances their effect is so rapid that they are useless for that very reason. The history of the discovery of

these new accelerators is quite interesting, says a writer in the *Revue Universelle des Mines*.

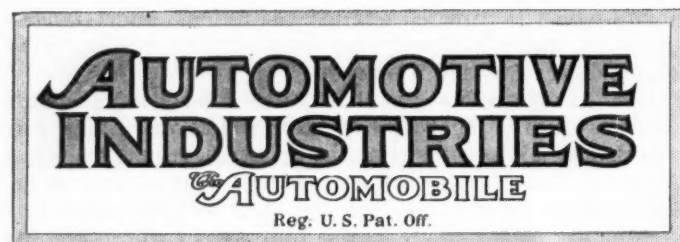
In experiments with synthetic rubber, it was observed that this material had the serious defect that it reacted very slowly with sulphur, some grades vulcanizing hardly at all. The experiment was then tried of adding materials which were thought to exist in small quantity in natural rubber and which acted as catalysers in the vulcanization. Eaton and Grantham proved that the proteins, which are always present in crude rubber, accelerate vulcanization.

The first patent dates from November, 1912, and is issued to the Elberfelder Farbenfabriken vorm. Bayer. It covers the use of piperidine in small quantities. This substance has an accelerating effect on the vulcanization of not only synthetic but also natural rubber. Now that synthetic rubber has lost all commercial interest, in view of the enormous production of plantation rubber, these new catalysers, a product of the researches on synthetic rubber, are made to serve with an unexpected success in the vulcanization of both wild and plantation rubber.

The great majority of the organic accelerators discovered so far are nitrogenous compounds. Among them will be found the amines, the imines, the amides, and nitrogen derivatives. It must not be concluded that all of the members of these various chemical groups are capable of accelerating vulcanization. This phase of the problem is still obscure.

Another almost general characteristic of these substances is their basicity. Bayer in his patent of Jan. 1, 1915, says on this subject:

"The property of accelerating vulcanization seems to be common to all organic bases having a dissociation constant of more than  $1 \times 10^{-8}$ ." Since then, however, some exceptions to this rule have been found. Certain accelerators are not basic, but the rule given by Bayer is still valuable. It recalls the same properties of litharge and magnesia mentioned above. It may be added that caustic soda is a very powerful accelerator, but is not well adapted to industrial use, as it does not mix well with rubber. The Dunlop company has patented its use in the state of a solution in glycerine.



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## Secondary Inflation

HERE is what D. R. Crissinger, Controller of the Currency, said about so-called secondary inflation the other day. His remarks are pertinent to the automotive industry:

"I want to warn against any tendency to what I believe the economists refer to as a secondary inflation. If I understood them, we had a primary inflation during and immediately after the war. I take it that, in the realm of prices, they mean by primary inflation a general advance of prices, in a time when demand is greater than supply, the purpose being to check the demand and therefore make the supplies go farther.

"A secondary inflation, I take it, is quite a different affair; a tendency to advance prices at a time when there is a surplus of producing capacity, but a deficit in buying and consuming capacity; the theory being that as the public tends to buy on a rising market, the one effective way to make it buy is to make

the market rise. Now, it occurs to me that there are proper exceptions to all rules; and for myself, I do not believe that a public which finds itself unable to buy at a lower price level, is likely to be better able to buy at a higher level, unless its income goes up at least a little faster than prices advance.

"I saw it announced the other day that owing to the advancing price of wool there was likely to be a general, though for the moment moderate, increase in the price of woollen clothing; that on account of the condition of the cotton market, we might anticipate some advance in the price of cotton fabrics; and, finally, that some factors in the metal market were disposed to discourage orders at this time, hoping thereby to secure better prices later on.

"There is no use telling me that the man who is too hard up to buy a new suit at \$25, is going to rush around to the shop and buy the same suit when he finds it has gone up to \$35. That might be true of an occasional individual with an income so big that the difference between \$25 and \$35 is rather academic; but it is not true of whole communities, of the consuming mass of people at a time when they have fallen more or less into the habit of cutting the garment of expenditures in accordance with the cloth of income."

## More Efficient Airship Travel

ONE of the difficulties in connection with lighter-than-air craft is due to the fact that as the fuel is used up gas must be allowed to escape from the envelope in order to keep the buoyancy the same. For long trips the weight of the necessary fuel supply represents a considerable fraction of the weight of the whole machine and there is therefore a great waste of gas. This matter will be of far greater importance than it has been so far, if the expensive helium gas should come into use. It is therefore a fortunate thing that a way has been discovered to eliminate this waste. This consists in condensing the steam of the exhaust gases and carrying the condensate on the machine as ballast.

The water of condensation from a certain amount of gasoline, if the latter were completely burned in exactly the right amount of air necessary for the process, is 46.5 per cent heavier than the fuel. With some of the fuel not burning as a result of incomplete vaporization and with either too rich or too lean a mixture the proportional weights of fuel and water of condensation will be slightly different, but in any case there will be an excess of water vapor and it is not necessary to condense the last drop. Whatever excess there may be can easily be gotten rid of by suspending the operation of the condenser temporarily.

Thus with an airship fitted with an exhaust products condenser the machine will not rise to constantly higher altitudes as the fuel is used up, but will remain at a substantially constant altitude, provided there is no change in atmospheric temperature.

Unless some of the exhaust gas is allowed to escape the ship gets heavier right along, and the altitude of flight can be readily controlled by discharging some



of the water of condensation or other ballast carried. What is holding up the use of the non-inflammable helium gas in airships is its high cost of production, and it is gratifying to learn that a method has been developed for using this gas economically once it has become available.

## Cost of Human Unrest

A RECENT strike of the employees of the Brooklyn Rapid Transit Company in New York is said to have cost that organization \$2,483,483. This is a tremendous sum of money. The effect of such a loss on the profit and loss account of even the largest of industrial organizations can well be imagined.

The figures are of interest to the automotive industry because they serve to visualize again the actual cost of friction in industrial relationships. Losses of a similar character occur constantly in automotive production, even though few strikes actually take place. It is easier to visualize the cost of labor discontent when a strike is held, because the whole situation is brought to a focus by such acute difficulties. But minor irritations reflect in lack of production effort and lowering in efficiency and produce extra expense exactly similar to that caused by strikes with consequent tie-up.

Constant and close attention to the human factors affecting production will reduce these losses to a minimum.

## Crankshaft Lubricating Holes

THERE are two general methods of arranging the oil holes in crankshafts with pressure lubrication. One consists in providing all of the bearings with drill holes either co-axial or parallel with the crank axis and then drilling connecting holes centrally through the length of the crankarms, the open ends of all holes being plugged. The other method consists in drilling single inclined holes through adjacent main and crankpin bearings and the intermediate crankarm. The former method was the first to come into extensive use, but recently it has been practically displaced by the second.

Our reason for referring to this subject here is that in a recent technical paper issued by the Motor Vehicle Engineering Institute of the Saxon Technical College, Prof. Wawrziniok sounds a warning against the use of the inclined oil hole and recommends a return to the old method of drilling. His action seems to have been induced by the failure of a single crankshaft through its inclined oil hole, of which a photographic illustration is shown. He claims that the oil holes at the junctions of the journals with the crankarms come too near the surface, and that conditions are rendered still worse by the fact that very frequently, owing to scanty dimensions of the bearings, the fillets at these points are made entirely too small.

In the particular case cited a crack developed at the point on the inner side where the oil hole enters the crankarm, which first extended toward the sur-

face of the crankpin and then produced a helical permanent fracture corresponding to the torsional stress on the pin. The crankshaft was of the case-hardened type, and one more objection urged against the method of drilling is that the oil hole lies at the junction of journals and crankarm in the hardened case at a point which, on account of the great aggregation of material, does not permit of change of form in quenching.

The author concludes that this method of drilling the oil hole is undoubtedly somewhat cheaper, still it is better to stick to the old method and drill only in the direction of the crankshaft axis and perpendicular thereto.

It is always dangerous to reason from the particular to the general, and we believe that in this case the conclusion drawn is absolutely unsound. It is perfectly true that a crankshaft with inclined oil holes may break if the dimensions are inadequate or the shaft is injured in the process of manufacture. Without these defects of design and construction, however, the shaft with inclined oil hole is stronger in every way, and therefore less liable to break than the other type. The radial oil hole removes a good deal of metal from one particular section of the pin and that a section where the stress is either a maximum or at least materially greater than at the junction of the crankpin and crankarm, where the inclined hole comes near the surface. Therefore, the shaft is less weakened by the inclined than the radial oil holes, and this was one of the considerations which led to the adoption of the former. That one crankshaft with inclined oil hole should have failed is far from proving that this particular method of drilling is inferior.

## It Works Both Ways

SALESMEN too often regard market analysis as a cold-blooded study of a territory with the human equation carefully omitted, thus enabling the factory to apply pressure to obtain the desired sales results. This is true to the extent that a knowledge of production costs enables pressure to be applied to factory workers. Needless to say, production costs must be known.

Ignorance of actual demand for a product within a territory sometimes acts to the disadvantage of the selling organization and salesmen as well as to the parent organization.

An Eastern factory branch had difficulty in obtaining the necessary quota of sales from part of its territory, and three salesmen had come and gone in rapid succession through inability to get results. At this time a research department was established and its first undertaking was to analyze this territory. It was found that there was not enough business to be had in the territory to keep one salesman alive.

This example helped to convince a skeptical sales force of the value of market research and gained for the manufacturer a much needed co-operation from the entire selling organization for further analytical work.

## June Output Likely Better Than 250,000

May Exceed Previous Month—  
Second Quarter Will Ap-  
proximate 725,000

By JAMES DALTON

NEW YORK, July 3.—There is substantial reason to believe that production of passenger cars and trucks for June exceeded a quarter million. A preliminary survey of the shipping figures for the first three weeks of the month indicates that the total will be larger than in May, when it reached 256,000. It is almost certain to be as large. Output for the second quarter, therefore, will approximate 725,000.

Even to those within the industry it seems almost unbelievable that so many motor vehicles could have been absorbed in three months. With the country just recovering from a long period of depression, sales have been larger than ever before for a like period.

### Seasonal Decline Expected

In the face of the tremendous business of the quarter just closing, it seems inevitable that there will be a seasonal decline this month. Spotty retail sales conditions in certain sections indicate that it already has begun, but there are no signs that it will approach the proportions of a slump.

The falling off in sales already apparent has been largely the result of local conditions and is by no means general. It has been in certain sections of the South and in some industrial cities. On the other hand, trade still is brisk in Tennessee and North Carolina and in many of the manufacturing centers.

Buying of passenger cars in the farm districts, up to this time, has been chiefly by business and professional men. The real farm market has not opened, and when this agricultural buying gets under way it may do much to hold up the volume of business. July is certain to be a big month, although production will be smaller than in June because several companies will close the first half of the month for inventory, and all were down over the Fourth of July.

### One of Best Year's in History

No matter what happens in the remaining months of 1922, distributors and dealers will have had one of the best years in their history, and many of them will do better than ever before.

The parts and accessory branch of

the business still is running at top speed. Many manufacturers have commitments running through September and some of them into October. Vehicle manufacturers are displaying caution, however, and will govern production by demand. In the face of an unprecedented demand, there is no disposition to be reckless.

## Maxwell Acts to Retire Notes Year Before Due

DETROIT, June 30.—The Maxwell Motors Corp. has invited tenders for the immediate sale to it of its 7 per cent series D gold notes aggregating \$1,000,000, the maturity date of which is June 1, 1923. This step to retire the notes almost a year before they are due is declared to be in line with the action of the company in March last, when it retired \$4,000,000 of series A gold notes from 60 to 75 days before maturity.

The gradually increasing ratio of current assets as compared with current liabilities and the quick surplus thereby available enables the Maxwell company to take this action. Much of the credit for this gratifying position is given by President Wilson to the executives in the various departments who have made it possible to reduce operating costs and expenses to a minimum without sacrificing quality.

## Underwriters to Conduct Anti-Accident Campaign

NEW YORK, July 3.—The National Bureau of Casualty and Surety Underwriters, of which Jesse Philips, former state superintendent of insurance, is general manager, has decided to conduct for its members an automobile accident prevention campaign and has appropriated a substantial sum for the purpose. The bureau makes the rates for automobile insurance other than fire and theft, and its membership includes 23 of the leading stock casualty companies.

The campaign was decided upon for business reasons. Statistics for the year 1921 show that there were 12,500 deaths from automobiles in that year and more than 300,000 other accidents. The efforts of the bureau will be directed along fundamental lines such as expert studies looking toward better control of traffic conditions, development of safety education in public schools and among drivers and stimulation of intelligent treatment of the subject by local authorities.

### DYNETO SOLD TO OWEN

SYRACUSE, July 3.—The Dyneto Electric Corp., which manufactures electric starting and lighting systems for automobiles, has been sold for the benefit of creditors to R. M. Owen of New York for \$205,000. AUTOMOTIVE INDUSTRIES announced several months ago that Owen had made an offer to the creditors for their claims and that he would take over the property.

## Many Plants Close to Take Inventory

This and Other Factors Will Pre-  
vent High Marks for July—  
Shortage of Materials

DETROIT, June 30.—Many leading factories will close down for inventory in the first week or two of July, and practically all will be closed for July 3 and 4. Because of this and because there are five Saturdays in the month, there will be no production marks established, but practically every factory, and certainly the leading ones, will operate on the same daily schedule as set in May and June.

This means that Ford will be on a 5000 daily schedule, Dodge Brothers, 600; Maxwell, 350; Hudson-Essex, 300; Paige-Jewett, 160; Hupp, 150; Studebaker, 440; Buick, 400; Oldsmobile, 120; Chevrolet, 1100; Cadillac, 100; Packard, 80; Wills Sainte Claire, 50; Cincin, 35; Liberty, 35; Oakland, 100; Dort, 80; Columbia, 50; Rickenbacker, 30; Reo, 100; Earl, 60; Durant, 100; Chalmers, 25, and Gray 20.

### Parts Releases Large

Releases on parts and material are on a par with releases for the two leading months of the year, parts makers declare, and leading unit makers assert their factories will operate on a full schedule throughout the month. That these parts will go into finished cars and will not be stored is indicated by the releases on parts that go into cars just preliminary to their shipping.

Continental Motors will get large production on its light six engine and will be in a position to make deliveries on a basis approximating the demand from customers using this model. The demand is running heavily on all models, truck factories showing steady increases and special models in the passenger car field maintaining steady demand. Production on the Star engine will increase steadily throughout the month.

There is some shortage of materials, but it is mostly on small parts and fittings and differs in different factories. There has been a steady evening-up of inventories until at this time a satisfactory balance has been established. Though releases are for the most part on a 30-day basis, some factories are ordering through the August period and these releases reflect a great deal of confidence on the continuance of buying through the summer.

### Experiment with Light Cars

A number of factories are experimenting with light cars which may be introduced for the fall market. These specialized unit cars are by makers formerly exclusively in the \$1,800 to \$3,000 field and will be supplementary to their usual lines. The cars will be priced from \$1,200 to \$1,500.



## Parts Orders Gain With Bus Demand

Business From Car Makers Sustained But Not Rushed as in Past

MILWAUKEE, July 3—Added to the pressure which continues to be exerted upon automotive parts industries in Milwaukee and vicinity by the requirements of passenger car manufacturers, is increasing pressure from the builders of commercial cars, notably those making a specialty of passenger-carrying vehicles. This is reflected by the gradual turn of commercial car demand upon local manufacturers and distributors for coaches, buses and stages, rather than trucks for purely freight transportation.

### Good Market for Trucks

There is a good market here and elsewhere for motor trucks of all classes, with the lighter types, ranging from  $\frac{3}{4}$  ton to 2 ton, in best call. But judging by the turn of demand which has been going on several months, a field heretofore only slightly touched by local truck factors is opening wide. This is that of passenger vehicles which compete with electric and steam railroads in quantity transportation of persons. The truck industry here looks to see this become one of the principal sources of demand pending the gradual resumption of ordinary business, such as more or less standardized types of freight vehicles.

The feverish tone of demand for automotive parts from passenger car factories has been relieved to some extent, although volume is well sustained. Manufacturers now seem content to spread their needs over a longer period, and the characteristic "rush" orders of February, March, April and May were supplanted during the greater part of June by less insistent specifications. Some take this to mean that during the last half of the year passenger car production schedules may show a decline, which would be only a more or less seasonal development.

### Parts Schedules Sustained

On the other hand, parts production schedules not only are sustained, but most manufacturers are still making increases to meet the better call for commercial car factors. If the tractor trade continues to make the better showing reported in the last 30 to 60 days, refreshing volume is likely to result for the parts industry.

The supply of skilled labor is now below the demand, although there is a plethora of semi-skilled workers who in 1919 and the early part of 1920 were accepted as skilled men due to urgent necessities. Strict discrimination is now the rule, due to the demands of the newer times.

### TEXAS CO. PROTECTS PRODUCT

DETROIT, June 29—An order restraining the sale of a type of oil refined and

## Automobile Distributor Will Function as Jobber as Dealers Multiply

By W. J. DRUMPLEMAN,

Sales Manager of the Rickenbacker Motor Car Co.

DETROIT, July 3.

DEVELOPMENTS in the field of automobile distribution indicate that in five years from now the distributor as we have known him to this time in the industry will have passed completely out of the picture. Instead we will have in the large cities the same man perhaps, but he will be nothing more than a high-class jobber with scores of retail establishments in all sections of his districts.

The developments of the community dealer in the large cities sounds the knell of the former distribution system where one company held sole responsibility for the sale of a car in a city whose population ranged into the hundreds of thousands or into the millions. The intensive development of sales territories in the cities is the biggest progressive movement in the industry to-day with dealers in all sections of the cities.

The convenience of the automobile is greatly enhanced, service is brought much nearer home for the owner and he is enabled to have his car taken care of without going miles to the central automobile district. Prospects have been found to drop into the smaller retail establishments who were timorous about entering the large places.

The success of the companies which have multiplied their dealers in the cities up to this time indicates the soundness of the movement. There will be a tendency to price cutting with the increase in dealerships and this will require counteracting. An important feature of the development of numerous dealers is that it will give buyers with cars to trade an opportunity to place their car to the best advantage.

Only this month there was a sale in Detroit that would have been lost to one of the factories because their distributor was long on used cars and could not offer an advantageous allowance. One of the sub-dealers was short and took in the car at a reasonable price and the sale was saved to the factory.

Under this increased dealer plan the distributor will continue to do a retail business, but his main work will be as a jobber. It will be his particular province to look after his retail dealers rather than his own retail sales. I do not look for a drawing of the line on sections in a city in which dealers will be required to restrict their operations, but rather that they will be permitted to make sales wherever possible buyers will buy in their own localities because of the general convenience afforded.

sold by the Texas Co. as "gun oil," as automobile motor oil, was issued by Judge Tuttle in Federal Court against David Berlin, an accessory dealer here. The order temporarily restrains the sale or the use of the Texas trade mark or name. The oil was purchased from the Government.

## Columbia Motors Dines Bankers and Parts Men

DETROIT, June 29—Columbia Motors Co. had as dinner guests at the Columbia Club this week bankers and representatives of parts makers who will supply materials for the new Columbia light six. The purpose was to urge adequate deliveries to meet the production plans of the company.

The slogan of the evening was "1650 cars in July or bust." President J. G. Bayerline was the host of the supply men. Those who spoke were W. E. McConnell of the Detroit National Bank of Commerce; W. N. Nesbit, Peninsular State Bank; John G. Painter, Detroit Pressed Steel Co.; Norman I. Taylor, Albee Corp.; W. A. Fredericks, vice-president and chief engineer, Continental Motors Corp., and E. F. Kellum, purchasing agent of Columbia.

## Allen Personal Property, Not Real Estate, Is Sold

COLUMBUS, July 3—The sale of the assets of the Allen Motor Car Co., which was started June 27 under the receivers, George A. Archer and W. C. Willard, progressed satisfactorily with the exception of the real estate. The personal property was sold out in about 100 different lots at fairly good prices.

Service rights were sold to A. O. Dunk, Detroit, for \$66,000. A bid of \$150,000 on the Columbus plant was not accepted, as it has an assessed valuation of \$303,830. Steps will be taken to offer the plant for sale at a later date, according to the receivers.

### STAR OF MICHIGAN FORMED

DETROIT, June 29—Articles of incorporation of the Star Corporation of Michigan were filed in Lansing this week. Capitalization is for \$20,000, but this amount is to be increased, it was declared. The Michigan company will be the sales organization for the Star cars made at the Lansing plant of Durant Motors. It was announced that a distribution plan entirely new in the automobile field would be made public soon in connection with the new car.

## PLANTS EXPECT SEASONAL DECLINE

### Business Falls Off in Certain Sections

No Signs Apparent, However,  
That Decline Will Be in  
Nature of Slump

NEW YORK, June 29—Indications that retail sales of automobiles are due to fall off in the near future is found by factory executives in the increase in the number of spotty sections and the appearance of some points at which business has shown a decided falling off. By this time, however, the losses in some sections have been overcome by increases in others so that factory production for at least another month will be close to capacity.

Southern districts are showing the greatest decrease in business at this time. This is not general throughout the South, however, as some sections are maintaining a very brisk buying, this being especially true in Tennessee and North Carolina.

#### Farmer Not Buying Yet

Industrial cities in the East and Middle West which have been slow in overcoming the after-war depression and which have been affected by strikes and other causes are showing recessions in sales, buying in some places having come to an abrupt halt. Other industrial cities which have been favored with good business throughout the year continue to absorb cars steadily. Many of these good and bad spots are located within a few miles of each other, as, for instance, Baltimore and Washington, the former falling off and the latter increasing.

Buying in the farm districts to this time has for the most part come from professional and business men rather than from the farmer himself. This buying has been relatively light, but scattered through every farm section in the country. The real farm buying is not expected to get under way until August or September when the turnover of crops is well under way.

Manufacturers do not look for a severe falling off during the summer, but take the attitude that if there is an unusual drop in sales they must shape their policies to meet a lighter business.

#### Year Will Exceed 1921

Almost any sort of buying will bring the industry to a point where it will exceed the business of 1921, and fair business the remainder of 1922 will mean a very profitable year for the industry as a whole. Most leading companies have done more business in the first six

### BUSINESS HOLDING UP

BERKELEY, CAL., June 27—Retail automobile sales are keeping up with last month. Sales of Fords and medium priced cars are best.

PHILADELPHIA, June 27—Automobile sales are holding up and no decline is apparent yet. Used cars are selling well.

ST. LOUIS, June 27—Retail automobile sales are holding up remarkably well and June will be as big as April and May for most dealers. A decline is expected in July.

BOSTON, June 29—Boston distributors and dealers report that there seems to be no letup in buying. April was good because it followed the show in March. May was even better, and June has been exceptionally good.

months of this year than they did in all of 1921. With good normal business in the summer and fall months the industry will create a new yearly production mark.

A leading sales executive declared this week that the buying of the year has been due more to a belief on the part of general business that good times were coming rather than that they were here. He takes the position that there has been little buying on the part of the conservative business man and worker, and that this business will manifest itself in 1923, when the other industries of the country are on a more stable basis.

A summary of retail sales conditions in twenty representative cities follows:

### LOUISVILLE

LOUISVILLE, KY., June 27—Automobile sales are keeping up the high mark set in April and May, according to a report issued to-day by the Louisville Automobile Dealers Association. Sales for the first five days of last week amounted to 364 cars, of which 143 were new cars and 221 used cars. This period is in excess of any week yet established this season.

With the probable sales of Saturday included the total will no doubt exceed 400 for the week, which is 12 per cent more than any week of the season. Of the 143 new cars sold, 19 were in the high priced class, 26 in the medium priced class and 98 in the low priced class. This is practically the same proportion of the high, medium and low priced cars that has prevailed during the current season.

### CHICAGO

CHICAGO, June 27—Retail sales of automobiles in Chicago continue at a high volume. Taken week by week, there has been some fluctuation through June. Some dealers are having a number of cancellations because of their inability to make deliveries. These sales usually are not lost to the industry because the purchaser immediately buys some other car upon which he can get prompt delivery.

### DETROIT

DETROIT, June 27—Retail buying in the Detroit district is declared by dealers to be normal for this time of the year, but not as good as earlier in the spring and tapering off with the approach of the mid-summer months. Deliveries on standard lines of cars are still from two to six weeks behind, but are expected to be fully caught up on all models by Aug. 1. Sales of used cars have slowed down considerably since June 1 and a number of dealers have declined to accept any more cars in trade. The shortage of new cars through the spring aided materially in keeping used car stocks low, but these have been slowly increasing during June. Used car prices are high. The summer months will witness a special effort to clean out used stocks in preparation for fall business.

### BUFFALO

BUFFALO, June 27—Retail automobile sales in this city have shown no sign of falling off, according to information obtained from Executive Secretary Proctor of the Buffalo Automobile Dealers Association.

"The retail business during June," he said, "was easily 100 per cent better than in the corresponding month of last year. The same thing is true with reference to the business done by Buffalo's automobile retailers during May of this year, and their business in April was at least 45 per cent better than in April, 1921. A number of the dealers here report trouble in getting enough cars to meet the demand. Some models, they say, they cannot get at all. Of course, this is to be expected. The regular seasonal decline in demand will come in midsummer, but up to date business has been fine."

### DENVER

DENVER, June 27—Although some dealers report that there is a beginning of a slight sales decline and expect moderate trade in July, June far surpasses May and also last June, and some say it is the best month in two years or more. New car sales are holding stronger than used cars and July is predicted to exceed last July. The general feeling is optimistic for the following months.



## CONDITIONS THROUGH COUNTRY VARY

### LOS ANGELES

LOS ANGELES, June 27—Such cars as Ford, Chevrolet, Dodge, Buick, Studebaker and other makes of corresponding prices show an increase in sales. Hudson and Chandler are fighting hard to hold their own. Packard single six and Cadillac continue to gain. Other high price makes are running behind last year's business. Registration for June undoubtedly will be larger than the same month a year ago, but it may not equal May.

### TOLEDO

TOLEDO, June 28—Automobile sales have declined here only slightly in the last two weeks. Some dealers report that they are holding up as good as they have for the last two months. All are considerably behind in the delivery of cars. The demand for light used cars is big now. The Willys-Overland branch here reports that sales are considerably ahead of deliveries and while declining slightly in the last ten days they are far ahead of the same period in other years.

### FORT WAYNE

FORT WAYNE, IND., June 27—Business has taken a spurt in this locality. Dealers in popular priced cars state that they cannot get enough to supply the demand. Deliveries on certain models, particularly sedans, are not guaranteed under a month. Not only are the dealers experiencing greatly increased business, but all the manufacturers turning out automotive equipment are also feeling the same spurt.

### SPOKANE

SPOKANE, WASH., June 27—No material reduction in retail sales is apparent here. Many firms will establish new high retail records this year while others will be hampered because of the inability of their factories to supply the demand. Lower priced car dealers are doing a land office business. The president of the Spokane Automobile Chamber of Commerce expects the heavy retail sales to continue during July.

### DALLAS

DALLAS, TEX., June 29—June was the best month of the past year and a half, automobile dealers say. More than 1000 new automobiles were sold by the Dallas retailers. Something like 1000 used cars changed hands. There was an increase in truck and tractor sales and a decided increase in sales of tires, tubes and accessories. Some of the dealers reported business increased more than 50 per cent over the same month for last year.

### SALES DECLINE NOTED

ATLANTA, June 28—Dealers and distributors advise that sales during the last two weeks of June fell off somewhat as compared with the first half of the month, but that business as a whole continues entirely satisfactory as compared with the same period of a year ago.

DES MOINES, June 28—Any change in retail conditions noticeable is toward slackening, but it is very slight and applies only to cities and larger towns. The farmer and small town business is showing signs of improvement.

MILWAUKEE, June 27—Dealers say that the retail demand is more spotted, having skimmed the cream of prospects, but that the June volume nearly equals May which was the heaviest month on record. A seasonal decline is looked for in July and August, but no marked slump is expected.

### KANSAS CITY

KANSAS CITY, MO., June 27—Motor car dealers almost unanimously say that sales of passenger cars have been better the past week than any time this year, and that June has been a good month. This is true both of firms selling high priced cars and those selling low priced cars.

Special conditions have helped some firms to build a really important volume of business in the past two or three weeks, such as announcements of new models and the entrance of new firms into the distribution, and the extraordinary efforts at publicity and selling that accompany such changes. But both for those who have these special reasons for expecting increasing trade, and for the old established companies, the volume has been steadily growing in June.

### BIRMINGHAM

BIRMINGHAM, ALA., July 2—Stimulated by the industrial revival in the Birmingham district, automobile sales have shown an increase here of 15 to 25 per cent during the last thirty days, according to local dealers. Business is declared to be better on July 1 than for twelve months or more.

Virtually every mine, furnace, factory and industrial plant in the Birmingham district, which includes many miles surrounding the city, are in operation now, after a period of inactivity which lasted nearly two years, according to the Birmingham Chamber of Commerce.

## Ford Output, 79,496 Better Than in 1921

Total Production for First Five  
Months This Year Reached  
409,309

DETROIT, June 30—Production of the Ford American and foreign plants in June, excluding the Ford Motor Co. of Canada, will carry the total production for 1922 to date over the half million mark. Excluding any of June's output the American and foreign plants have turned out exactly 409,309 cars and trucks, while the total for the same period in 1921 was 329,813. This established a lead of 79,496.

Of the May production of 134,762, the Kearny, N. J., branch led with 14,706, about 3000 more than the April total. Detroit produced 11,524, with third place about equal for Philadelphia, Buffalo and Chicago, with 6500 each. The business of the Buffalo plant is declared to have shown considerable increase. The highest single day's assembly mark was made May 31 when 5099 cars were built. This mark was moved up on June 5 to 5281.

Tractor production at the River Rouge in May reached 8950, and 155 were built at the Cork, Ireland, plant. The River Rouge output represents an increase from 7466 in May. Total production of Fordsons for the year to the end of May was 25,011. The total for the same period in 1921 was 20,936.

Without the receipt of any additional orders, the Lincoln Motor Co. plant will be at capacity for four months to meet the business now on hand, the company reports. Despite demand, it is declared, production will be kept down to a point where it is possible to give each car painstaking attention. The present production rate is approximating 35 daily.

## Truck Outlook Promises Record Breaking Months

PONTIAC, MICH., July 5—The best June in the history of the plant and one of half a dozen leading months at any season, says Sales Manager Vance H. Day, of last month's General Motor Truck Co.'s business. Prospects for July he declared to be very good, although there was a tendency last week toward a lull in orders. Special activity among agents offset this, however.

August, September and October are likely to be record-breakers in truck business, Day says. Increased business on heavier models, Day says, indicates that industrial concerns are back in the market for trucks.

A similar outlook is reported by the sales department of the Oakland Motor Car Co.

## Discontinue Maxwell Branch in New York

New Distributor Takes Its Place  
—No Change in Policies,  
However

DETROIT, June 29—With the organization of the Colt-Stewart Co. in New York City by William L. Colt and William D. Stewart to take over the distribution of Maxwell-Chalmers cars in that territory, the former Maxwell-Chalmers branch has been discontinued and placed in the hands of a distributor.

William L. Colt has been identified with the automobile business since 1904 when he was associated with the Cleveland Motor Car Co. In an executive capacity, five years later he organized the Colt-Stratton Co. in New York as general Eastern distributor for the Cole Motor Car Co. of Indianapolis. This concern attracted the attention of Dodge Brothers by its success and in 1914 it was named metropolitan dealer for the Dodge car.

Dodge and Cole were handled jointly by the company until 1917 when Colt withdrew from active work in the company to accept the position of Eastern division manager for the Willys-Overland Co., from which he retired to form the Colt-Stewart Co. to take over the Maxwell-Chalmers sales.

### Colt with Overland

During Colt's association with Willys-Overland he formed a close association with Stewart, who in 1917 was made manager of the New York branch of the New York branch of the Willys-Overland Co. Stewart joined the Willys organization in 1916 after a varied business experience, and after fourteen months of service was appointed to the New York managership.

In announcing the change in its New York distribution, Vice-President A. E. Barker of Maxwell-Chalmers said that the new company would carry out the same general policies that were in force during the branch operations. The business will continue at the same address and the sales organization will continue as formerly.

### TEST-HOUSE PROGRESSING

PONTIAC, MICH., July 3—Rapid progress is being made on the test-house at the plant of the General Motors Truck Co., where extensive electrical apparatus purchased for utilization of power developed in the testing of machines will be installed. The completion of the test-house will make possible largely increased production. The electrical equipment is on hand, awaiting completion of the building.

### LA FRANCE TRUCK UNCHANGED

NEW YORK, June 30—Walker Motors, Inc., which has purchased the assets of the Ward LaFrance Truck Corp. of El-

### EMPLOYMENT GAINS 2,497

DETROIT, July 3—Members of the Employers Association report the addition of 2,497 workers to their payrolls last week. The total now is 180,971, as compared with 109,000 in the same week last year and 189,000 for the same week in 1920

mira and will remove the plant to this city, especially for the New York market, announces that no radical changes will be made in the design or construction. The truck will be known as the Walker-LaFrance. A. Ward LaFrance, formerly president of the Ward LaFrance Truck Corp., will be in charge of production.

## Firestone Will Operate Canadian Plant, Sept. 15

AKRON, July 3—The new Canadian plant of the Firestone Tire & Rubber Co., at Hamilton, Ont., will be ready for operation about Sept. 15, officials of the company here have announced. The site at Hamilton consists of 60 acres of land located on the Hamilton Bay. The main plant, already nearing completion, will be a five story building of fireproof construction. Machinery is now being installed.

The Canadian factory will start with an initial production of 1500 tires a day and later will manufacture numerous lines of rubber goods, including tubing, belting, hose and possibly rubber boots and shoes.

Firestone expects its Hamilton plant primarily to serve Canadian dealers, having 2200 dealers under contract in Canada. A large export business is also assured for the Canadian plant by reason of the preferential duties enjoyed by Canadian manufacturers.

## College to Hold Annual Summer Industrial Course

STATE COLLEGE, PA., June 30—The seventh annual summer session in industrial organization and administration will be held at the Pennsylvania State College here from Aug. 28 to Sept. 9. The course is designed to meet the needs of manufacturers and factory executives. Its purpose is to assist men in the development of their jobs and to broaden their horizon.

The work will be divided into discussions on industrial organization, manufacturing methods, employment, industrial relations, factory planning, material and production control, scheduling and dispatching, purchasing, cost accounting and kindred subjects. The greater portion of the time will be devoted to practical installation methods, using the equipment of the five shops and the other facilities of the department that have been especially designed to handle this type of work.

## Sanctions Maibohm Sale to Creditors

Arrow Motors to Take Over Property—Former President Will Appeal

TOLEDO, June 30—Federal Judge Killits confirmed to-day the sale of the property of the Maibohm Motors Co. to a creditors committee which has incorporated the Arrow Motors Co. as a successor. Minority creditors who did not come in under the plan for acceptance of preferred stock in the Arrow company will be given until July 20 to prove their claims. H. C. Maibohm, former head of the Maibohm company, is included in this group. The creditors committee which took over the property is headed by E. G. Kirby, trust officer of the Commerce Guardian Trust & Savings Bank of Toledo.

After a hearing yesterday afternoon Judge Killits said he favored confirmation of the sale and the general plan adopted for organization of the new company, but that he would take the case under consideration before signing the order. H. C. Maibohm had made an offer to the court to bid \$100,000 cash for the assets. Many of the creditors doubted his ability to make possible a cash distribution, however. Under the present plan creditors will be given preferred stock in the Arrow company.

### Maibohm Will Appeal

Maibohm asserted that an appeal would be taken from the order by Judge Killits confirming the sale on a stock settlement basis. He declared the majority of creditors want the sale made for cash.

Arrow Motors, with A. C. Burch as general manager, is preparing to put the plant into operation soon.

Claims against the Maibohm company aggregate \$600,000, and all but \$60,000 are represented by the creditors committee.

## National Safety Sections Will Hold Joint Meetings

CHICAGO, June 30—Subjects of interest to the industry will be discussed at a joint meeting of the automotive, drop forge and metals sections of the National Safety Congress in Detroit, Aug. 28 to Sept. 1. The chairmen of the different sections will be:

Automotive, A. L. Kaems, safety engineer, Simmons Co., Kenosha, Wis.; drop forge, E. C. Evans of the Wyman-Gordon Co., Worcester, Mass.; metals section, J. R. Mulligan, safety inspector of the Bethlehem Steel Corp.

The program follows:

"Safety in Handling Material," C. E. Ralston, Equitable Life Assurance Society, New York; "How the Plant Surgeon Can Help in Accident Prevention," Dr. L. A. Shoudy, Bethlehem Steel Corp.; "Safe Practices in Acetylene and Oxygen Welding," H. S. Smith, Prest-O-Lite Co., New York.



## Tire Sales Reached High Mark in June

Surpassed Period of Normal Production in 1920—No Decline in July

AKRON, July 3—June was the greatest month from the standpoint of volume of sales, in units, in the entire history of the tire industry, in so far as the Akron district is concerned, not even excepting the short-lived period of abnormal production during early 1920.

Estimates show over 2,500,000 tires of every size and description manufactured in the Akron district, which includes the Mason company at Kent and the Seiberling Co., at Barberton during June.

The Firestone Tire & Rubber Co. reports June was the biggest month in the company's history, with sales in units larger than ever before. Firestone produced nearly 750,000 tires in June, averaging 25,000 a day and running in excess of that mark during the latter half of the month.

The Goodyear Tire & Rubber Co. states that its June sales of cord tires exceeded June sales of 1921 by nearly 100 per cent. Practically all other tire companies here report sales showing from 50 to 100 per cent increases over the corresponding periods of last year.

### Demand Is Widespread

"We sold more tires in June than in any previous month in our history," state Firestone officials. "The demand seems very general for our products and comes from all sections of the country, the increase being mostly from dealers who have been carrying low stocks and are now in their full selling season. Manufacturers' business and export shipments are also increasing. With tire prices on so low a basis, the consuming public is purchasing freely, knowing that tire values are in accord with the times."

Akron companies report July orders so far booked do not indicate that there will be any appreciable diminishing of sales at least during the fore part of the month, although a slight tapering off of production during the latter weeks is anticipated. The usual seasonal slump in sales which comes in August, it is stated, will cause manufacturers to reduce production and perhaps to stabilize the industry on a basis of about 75 per cent of present aggregate production.

## Fisher Plans Building for Shepard Art Metal

DETROIT, July 3—The Fisher Body Corp. has decided to erect a large new factory building for the Shepard Art Metal Co., which is now located at Grand Boulevard and Hastings Street, and which is owned and operated by the corporation for the production of hardware fittings.

Work already has begun at Junction Avenue and Michigan Central railroad,

## IN LAST NINE YEARS AMERICAN MAKERS SOLD 5 PER CENT OF OUTPUT ABROAD

WASHINGTON, July 3—Exports of passenger cars and motor trucks during the past nine years show, according to estimates based on figures compiled by the automotive division of the Department of Commerce, that the American car manufacturers have sold abroad approximately 5 per cent of their total production.

The exact amount of foreign business during this period cannot be definitely determined, because of the fact that motor trucks exported during 1915, 1916 and 1917 were largely United States war supplies. In arriving at the 5 per cent estimated, the trucks sold during these years and shipped to the allies are not included in the compilation.

The following table shows the percentage:

	PASSENGER CARS			MOTOR TRUCKS		
	Export	Production	Percentage of Exports	Export	Production	Percentage of Exports
1913.....	24,293	461,500	5.28	993	23,500	4.21
1914.....	28,306	543,679	5.21	784	25,375	3.10
1915.....	23,880	818,618	2.92	13,996	74,000	18.89
1916.....	56,234	1,493,617	3.76	21,265	90,000	23.70
1917.....	64,808	1,740,792	3.72	15,977	128,157	12.40
1918.....	52,312	926,388	5.65	12,200	227,250	5.38
1919.....	67,145	1,657,652	4.05	15,585	316,364	4.93
1920.....	142,508	1,883,158	7.56	29,136	322,039	9.02
1921.....	26,592	1,514,000	1.75	7,480	154,550	4.85

and the first unit will contain more than 100,000 ft. of floor space. It will be completed by Aug. 1. The plant ultimately will contain not less than 250,000 sq. ft. of factory space. The buildings will be of brick and steel construction and of the most modern type. There will be no exposed belting, and transmission equipment will be placed beneath the floors.

## Miller Rubber Co. Sells Service Stations in Ohio

AKRON, July 1—The Miller Rubber Co. has sold its tire service stations in Akron and Canton, Ohio, to the Instant Tire Service Co., an Ohio corporation. The new company acquires the entire fleet of service cars in both cities and continues the tire service offered local motorists. In these stations experiments looking toward improved service were tried out and the results broadcasted to all dealers throughout the country.

Service on Miller tires is now given exclusively by dealer sales and service agencies throughout the United States. The company has completed its service work and does not intend opening service stations in other cities.

### NEW IRON MOUNTAIN UNIT

MILWAUKEE, July 3—The Ford Motor Co.'s body plant and principal wood-working factories, established a year ago at Iron Mountain, Mich., under the name of the Michigan Land, Lumber & Iron Co., will be doubled in size at once by the erection of a second unit. This has come to light through the letting of a contract to the Worden-Allen Co. of Milwaukee for the structural steel work on the new shop. The Iron Mountain plant is in the heart of the best growth of hardwood timber, as well as an extensive softwood belt in the upper peninsula of Michigan.

## E. V. Hartford, Shock Absorber Maker, Dies

Did Much Toward Improving Automobile and Service Given by It

NEW YORK, July 3—Edward Vassallo Hartford, an outstanding figure in the automotive industry whose accomplishments will be long remembered, died Friday at his city home, the Hotel Devon in West 55th Street. He was buried from the home of his parents at Orange, N. J. He was 52 years old. He is survived by a widow and two children.

As the manufacturer of the Hartford shock absorber, which he put on the American market in 1904, the producer of one of the early electric starters, together with various other inventions, Hartford scored high in his efforts to better the modern motor car and the service it supplies.

Besides heading E. V. Hartford, Inc., he was many years vice-president of the Great Atlantic and Pacific Tea Co., a leader of the chain store system in this country.

Hartford had a pronounced touch of sentiment in his make-up, with a heart that went out to help anyone in distress. His friendships were legion, not only in the automobile industry but in his social life.

## Four-Passenger Coupe Added to Jewett Line

DETROIT, July 3—A four-passenger coupe has been added to the Jewett line. The price of this new model is \$1,395. The body is 77 inches long and 57 inches wide. All metal panels are used over a wood frame. Production will start during July.

## Air Engine Record May Come from Test

### Navy Department Completes Endurance Trial of Wright Aeronautical Product

PATERSON, N. J., June 30—The Wright Aeronautical Corp. of this city has announced the completion by the Navy Department of an endurance test which is believed to have established a new record for the continuous running of high duty aircraft engines.

The engine used is the model E-2 eight-cylinder type in which were made certain changes to be incorporated in future engines. The total duration of the test was 250 hrs., made in two periods of 125 hrs. each, during which the engine ran wide open at 1800 r.p.m. At the end of the first period the engine was torn down for inspection and again re-assembled, the pistons, which had not been designed for such long service, being replaced by others with a slightly heavier head. No other parts were replaced.

The valves, which were of the Thompson "Silchrome" alloy, were touched up, but it is believed this would not have been necessary had the run been continuous, since the valves of this material have shown unusual heat resisting characteristics and are said to have proved the most durable of any valves used in this severe service. Only two stops were made in the first 125 hrs., and these were due to accidental shutting off of the gasoline in one case and to breaking of an external oil radiator in the other, neither being attributable to the engine itself.

#### Further Stops Made

In the second 125 hr. run there were three stops, one for change of plugs and magneto, and the other two for changing the pitched clubs used for loading the engine, none of these stops being attributable to the engine itself. When the engine was torn down on completion of the run, it was found to be in substantially perfect condition, pistons included, indicating that the run could have been continued for a much longer time had it been desired to do so.

#### ACCEPT ALUMINUM OFFER

CLEVELAND, July 3—Stockholders of Aluminum Manufactures, Inc., decided unanimously at a special meeting here to accept the proposal of the Aluminum Company of America to lease its plant and purchase corporate stocks of subsidiaries as well as inventories.

#### ELECTRIC TRUCK BANKRUPT

SYRACUSE, July 3—The Binghamton Electric Truck Co. of Binghamton has filed a voluntary petition in bankruptcy in Federal Court at Utica, showing liabilities of \$14,234 and assets of \$15,379. When the company was formed, \$100,000

worth of stock was sold, and all that remains of this is the machinery in the plant at Binghamton.

The petition states that the reason for the action is the failure of the city of Hudson, N. Y., to pay the company \$8,000 which it promised if the concern moved its plant to that city.

### Hill Creditors Grant Extension of Claims

CHICAGO, July 1—The creditors committee of the Hill Pump Valve Co. of this city, manufacturer of automobile accessories and standard parts, has issued a letter to all creditors announcing an extension of claims under a creditors agreement and stating that the company is now operating at capacity with prospects of ultimate success.

The creditors are accepting notes due Dec. 1 in settlement of their claims, but further extension may be granted at the discretion of the committee, of which Fred J. Greenebaum is chairman.

The letter states that \$20,000 of new funds has been advanced to the company to enable it to care for its increasing business and that other advances will be made if needed.

### Former Auburn Officials Secure Control of Elkhart

FORT WAYNE, IND., July 3—The controlling interest in the Elkhart Carriage & Motor Car Co., manufacturer of the Elcar, has been secured by four Auburn men—A. M. Graffis, G. W. Bundy, F. B. Sears and W. H. Denison, who are now managing the plant. W. B. Pratt and George B. Pratt have retired from the company.

In the reorganization Sears will become president and general manager; Graffis will be secretary; Denison, treasurer, and Bundy will act as general superintendent.

All the new executives are experienced in automobile manufacture. Sears was connected with the Auburn company for 14 years, for a large part of this time as assistant general manager and treasurer. Denison served as secretary of the same concern, and Graffis and Bundy were respectively chief engineer and designer and general superintendent.

#### STUTZ HAS BEST MONTH

INDIANAPOLIS, June 29—A complete check-up of Stutz retail sales and factory output for May shows that it was far and away the best month for a long time. June factory records show that brisk business in the retail sales of Stutz cars continues. Complete reports of retail sales for June are not yet available.

#### FORD TO HEAR OF MEXICO

DETROIT, July 3—A. J. Lankford, manager of the Ford southern branches, is on his way here after a three weeks' inspection trip into Mexico to report on the advisability of building a plant at Tampico.

## Accessory Upturn Noted in Indiana

### June Will Probably Surpass May, Best Month Thus Far in 1922

INDIANAPOLIS, June 29—Wholesale and jobbing accessory business for Indiana during May was far ahead of any month during the last year. June business appears to be as great as May, and in many cases probably will exceed it. The general report of the leading jobbing houses in this city which sell throughout the state is that for the first three months of this year the business was on a general level, being quite low in some sections.

During April the upturn came, but it was not until May that the sales and shipment curve made a sharp upward line.

In this connection the record cannot be estimated correctly unless the fact is considered that there are considerable portions of the state where business in general is at a low ebb. The coal producing portions of the state are way off in the consumption and sale of accessories.

#### Dollar Value Increases

The fact that present records surpass those of last year in dollar value, in spite of decreased list prices and in the face of a considerable portion of the state where business is considerably affected by idleness, makes the new record highly satisfactory to the jobbing houses.

The volume of sales from the standpoint of the number of units of accessories and equipment sold is running well over 150 per cent as against the same months last year, and some of the jobbers look for a steady pull at this rate and possibly better for the next month and a half or two months. The early months of the year did not come up to conservative expectations of some of the leaders, but May and June have turned the tables, and the whole jobbing outlook for Indiana is very cheerful.

#### COMMITTEE FOR GEAR MAKER

SYRACUSE, July 5—The Weekes-Hoffman Co. of this city, manufacturer of automobile gears for replacement purposes, is in financial difficulties. Its future is to be determined by a committee representing the preferred stockholders and the board of directors. At a special meeting of the preferred stockholders recently a committee was named to decide whether to liquidate the business or continue it.

#### PROFIT FOR GERMAN BOSCH

PARIS, June 16 (by mail)—The Robert Bosch Magneto Co. of Stuttgart, Germany, shows a profit for the past year of 7,800,000 marks and has paid a dividend of 25 per cent.



## Men of the Industry and What They Are Doing

### Raskob and Swayne to Sail for Europe

J. J. Raskob, vice-president of the General Motors Corp. and chairman of the finance committee, and Alfred H. Swayne, vice-president in charge of banking relations, will sail for Europe Saturday. Their trip will be half for pleasure and half for business. They will inspect General Motors interests in England and France while abroad.

### Osborne Succeeds Montayne

James Montayne, who has been service manager for General Motors, Ltd., at London, will return to the United States and will be succeeded by Frederick Osborne, a member of the technical staff attached to the New York offices. Osborne, who will sail about July 15, has spent several weeks studying the production and service at General Motors factories.

### Goldie Now With Ruggles Truck

R. J. Goldie, for six years manager of the Columbia Axle Co., has been appointed general manager of the Ruggles Motor Truck Co. Frank W. Ruggles, who has been functioning as general manager since the foundation of the company, will remain as president, but will devote himself to the wider interests of the business. Goldie has been identified with the industry for a number of years. Years ago he built one of the first 1500 lb. motor trucks ever used in Detroit. He was connected with the Oakland organization for two years when he became chief inspector and superintendent for Chalmers. He remained with Chalmers for five years when he joined the Timken-Detroit Axle Co. as manager of the east side plant. He spent five years with the Timken-Detroit organization and in 1916 became factory manager and member of the board of directors of the Columbia Axle Co. He still retains his place on the directorate of that company.

### Weiss Retires from Hyatt

J. G. Weiss has retired from active duties as general manager of the Hyatt Bearings Division of the General Motors Corp. on account of his health, but remains in the Hyatt company in an advisory capacity. H. J. Forsythe, formerly assistant general manager of the division, has been appointed general manager. B. G. Koether, in addition to his duties as vice-president in charge of sales, becomes assistant general manager.

### Sloan Sails for Europe

Alfred P. Sloan, Jr., vice-president of the General Motors Corp. in charge of operations, and Mrs. Sloan sailed for Europe July 4 on the Aquitania to visit

England, France and Switzerland. His trip is in the nature of a vacation, although while in London and Paris he will look over the General Motors interests in those cities.

### Willoughby Goes With Columbia

David J. Willoughby has been appointed sales manager of the Columbia Motors Co. Before going to the Columbia, Willoughby served as Eastern sales manager of the Lally Light Corp. and before that was associated with Dodge Brothers for three years as traveling sales representative and with the Studebaker for six years in a like capacity. With the appointment, W. L. Daly, who was formerly sales manager and, previous to his connection with the Columbia, sales manager of the King Motor Car Co., becomes vice-president and director of sales and advertising.

### Tracy Leaves Globe Rubber

R. B. (Dick) Tracy has resigned from the Globe Rubber Tire Manufacturing Co., Trenton, N. J., where recently he has had charge of the sales in general. Tracy is well known in the automobile tire industry, having served for sixteen years as factory representative for the Michelin Tire Co. He has returned to his former home at Norwich, Conn.

### Falter Joins Electric Furnace

P. H. Falter has been elected vice-president and treasurer of the Electric Furnace Construction Co. Until recently he has been vice-president and general manager of the Canadian Electro Products Co. at Shawinigan Falls, Quebec. Prior to that time he had been general manager of the Baltimore Electric Alloys Co. Frank Hobson remains as president.

### Beckman Resigns from Richelieu

William Beckman has severed connections with the Richelieu Motor Car Co. and the Richelieu Motor Corp. His plans for the future are indefinite.

### Mason Rubber Plans Tire Fabric Plant

ATLANTA, July 6—Following the recent acquisition of the Owen Tire & Rubber Co. of Bedford, Ohio, by the Mason Tire & Rubber Co. of Kent, Ohio, H. R. Whitehead, of Millen, Ga., vice-president of the Western Reserve Cotton Mills Co., a subsidiary organization of the Mason company, advises that negotiations are under way for the acquirement of a third textile plant in the southern territory, to be used by the Mason company for the manufacture of tire fabric. The company now operates large textile plants at Millen and Quitman, Ga.

## Good Road Sponsors to Start "Pike" Tour

### Party Will Leave Detroit for 14-Day Swing Around Lake Michigan

DETROIT, June 30—The eighth annual "Pike" tour will leave Detroit next Friday noon for a fourteen-day swing around Lake Michigan, with the copper country of Michigan as its northern terminus. The tour, as in former years, is conducted by the Michigan Pike Association. During the two weeks' tour, Captain W. S. Gilbreath, manager of the Detroit Automobile Club and president of the M. P. A., will conduct seventy-seven good roads meetings. The object of the tour is to create interest in improved highways and to popularize through touring routes. Out of the 13½ days spent on the road, all but two days will be in Michigan territory.

Captain Gilbreath is organizing a staff of speakers for the tour and expects to have a half dozen prominent men from Michigan as speakers. The line-up includes Horatio S. Earle, "Father of good roads in Michigan," and Inspector Harry H. Jackson, head of the traffic division, Detroit police department, also Dr. P. E. Doolittle, Toronto, president of the Canadian Automobile Association and honorary vice-president of the M. P. A.

A large delegation from the copper country will meet the tour at Michigamme and passengers will be exchanged for the drive to Calumet. The tour will reach there at noon on Wednesday, July 12.

### Itinerary of Tour

The itinerary of the tour, with the noon stops, the first name follows: June 7, leave Detroit at noon, Owosso; July 8, Kalamazoo and Michigan City, Ind.; July 9, Chicago and Milwaukee; July 10, Manitowac and Menominee; July 11, Iron Mountain and Crystal Falls; July 12, Calumet; July 14, Marquette; July 15, Munising and Newberry; July 16, Sheboygan; July 17, Petoskey and Traverse City; July 18, Manistee and Muskegon; July 19, Holland and Grand Rapids; July 20, Jackson and Detroit.

### REPUBLIC EXPECTS BIG JULY

ALMA, MICH., July 6—The Republic Motor Truck Co. reports that its factory is now working at about 50 per cent capacity, and that during July it will build more trucks than for any month in two years. Colonel Frank E. Smith, president of the company, declares that farmers in Kansas and Nebraska have started buying and that the farm demands promise good business throughout the summer.

# Merger of Nine Companies Formed

## Associated Motors Plans to Buy More

### Payment for Assets Made in Stock on Basis of Inventory Valuation

CHICAGO, July 1—Announcement was made here to-day of the completion of the organization of the Associated Motor Industries, negotiations for which have been in progress for about 10 months. Preliminary plans for the formation of the merger were published exclusively in AUTOMOTIVE INDUSTRIES of Sept. 29, 1921.

The company as now organized is an \$80,000,000 corporation chartered in Delaware and has acquired by purchase full ownership of nine companies manufacturing automobiles, trucks, parts and equipment. The companies are:

National Motor Car & Vehicle Corp., Indianapolis, Ind., manufacturer of National cars.

Covert Gear Co., Lockport, N.Y., manufacturer of transmissions, clutches and other car controls.

Recording & Computing Machines Co., Dayton, Ohio, manufacturer of ignition systems, starters, magnetos and other electrical equipment.

Jackson Motors Corp., Jackson, Mich., manufacturer of Jackson automobiles and trucks.

Kentucky Wagon Manufacturing Co., Louisville, Ky., manufacturer of Dixie Flyer automobiles, and of trucks, wagons, wheels and bodies.

Saginaw Sheet Metal Works, Saginaw, Mich., manufacturer of sheet metal parts for automobiles and trucks.

Traffic Motor Truck Corp., St. Louis, Mo., manufacturer of Traffic trucks.

Murray-Tregurtha Corp., Boston, Mass., manufacturer of gasoline engines.

H. F. Holbrook Co., New York City, manufacturer of automobile bodies.

The officers of the corporation, offices of which will be at Dayton, Ohio, are: Chairman of the board, Will I. Ohmer, president, Recording & Computing Machines Co.; president, Louis Ruthenburg, formerly general manager of Delco Light plant of General Motors Corp.; vice-presidents, A. A. Gloetzner, president, Covert Gear Co.; Robert V. Board, president, Kentucky Wagon Manufacturing Co.; T. C. Brandle, vice-president

in charge of merchandising of Traffic Motor Truck Corp., and George M. Dickinson, president, National Motor Car & Vehicle Corp.

Ohmer will have entire charge of the operations of the company. In an interview to-day he stated that all the plants will be operated and that for the present the products of all of them will be continued. These include the Jackson, National and Dixie Flyer automobiles and Traffic trucks. It was said also that trucks would be manufactured at the Kentucky Wagon and Jackson plants. Development of a standardized line of cars and trucks is the ultimate object of the company, Ohmer said. This line is to include a four cylinder, a light six and a deluxe six-passenger car, and trucks of various capacities.

The companies in the merger have been acquired by purchase, payment being made in stock of the new corporation on the basis of actual inventory valuation of the various companies. Ohmer said that all companies taken in had to show assets having a ratio of three to one over liabilities. Although it was not divulged just what amount of capital stock was issued in absorbing the member companies, it is understood the combined net assets of the companies were listed at about \$23,000,000.

### More to Be Acquired

Negotiations are now in progress for the purchase of another group of companies, Ohmer said, for which additional stock will be issued. He said that in acquiring the first group no cash was spent except in taking up bonds and paying off some bank indebtedness of member companies. A \$6,000,000 bond issue is being arranged to aid in paying bank loans and to give additional working capital. It is also understood that some preferred stock will be offered to the public.

Detailed plans for operation of the plants have not yet been worked out. Ohmer and other officials will begin a tour of inspection of the various properties next week to determine the most

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## "Copper Cooled" Car Production Delayed

NEW YORK, July 5—Quantity production of the line of "copper cooled" cars which General Motors Corp. proposes to put on the market probably will not be started for several months.

It had been expected that they would be turned out in limited quantities by September, but C. F. Kettering, who has charge of their development, insists upon considerably more experimental work. He wants the new line tested under all kinds of weather conditions and on all kinds of roads.

## To Operate Premier Under Receivership

### Steps Taken to Conserve Assets Pending Reorganization of Company

INDIANAPOLIS, July 3—The Premier Motor Corp. was placed in the hands of a receiver July 1 by Judge Linn D. Hay of the Superior Court of this city. The Fletcher Savings & Trust Co. was appointed receiver.

The suit, said to be a friendly one, was filed earlier in the day by the American Foundry Co., a creditor. The petition sought judgment of \$2,970.82 and asked that the Premier officers be enjoined from interfering with any property or control after the receiver had been appointed. The amount involved is alleged to be due on a note signed by Charles S. Crawford, then vice-president of the Premier company.

### \$1,000,000 Debts Charged

The suit claimed that the Premier organization is indebted to many creditors to the amount of more than \$1,000,000. The assets are said to be sufficient to pay off the indebtedness under ordinary circumstances, but it will involve a great sacrifice if the assets are exposed to public sale. It is said in the suit that a large number of creditors and stockholders have formed a reorganization committee and that many of the creditors have agreed to the plan. The committee has taken steps to obtain the investment of new capital and to reorganize the company, and it will be able to consummate these plans if the property is not sacrificed.

E. E. Gates, attorney for the plaintiff, declared that the proceedings were decided upon last Friday at a meeting of the reorganization committee consisting of J. A. Price, Okmulgee, Okla.; Newton P. Hutchinson, Providence, R. I.; R. L. Craig, Detroit, and B. Hottel, Indianapolis. He stated that the plan of reorganization has received the approval of 95 per cent of the creditors, leaving but 5 per cent whose sanction of the plan has not been obtained.

### Will Hasten Reorganization

It is said that because five per cent of the creditors did not agree to the plan, it would have been necessary to have a judicial sale of the properties. Therefore the "friendly receivership suit" was decided upon as the means of hastening the proposed reorganization. The receiver will continue to operate the plant pending the effort of the reorganization committee to complete the plans now under way.



# Tire Dealers Seeking Conference

## Makers Will Assent, Probably, to Meeting

### Preliminary Discussions Draw Out Views of Both Branches of Industry

CLEVELAND, July 5—The board of directors of the National Tire Dealers Association and the tire manufacturers division of the Rubber Association of America probably will meet soon to discuss certain phases of the adjustment and stabilization of the distribution of tires.

This important meeting will be the result of a series of conferences in this city which preceded and followed a meeting of the Cleveland Retail Tire Dealers Association last Friday, presided over by R. F. Valentine, president of the National Tire Dealers Association. It was the largest gathering of tire dealers and tire makers ever held in Ohio, and the plain talking indulged in by both dealers and makers sent both sides from the room with information that was most enlightening.

The ball room of the Winton was crowded with approximately 350 dealers, manufacturers and makers' representatives when Valentine called for order. Men were present from New York, Philadelphia, Washington, Seattle, Minneapolis, Milwaukee, Baltimore, St. Louis, Kansas City, Indianapolis, Akron, Canton, Detroit, Chicago and Cincinnati.

### Viles Sure of Co-operation

A roar of approval greeted the announcement by President Valentine at the start of the meeting that A. L. Viles of New York City, general manager of the Rubber Association, who was in Cleveland for the meeting, had stated that when the tire dealers named a committee and requested a conference, the Rubber Association representatives, he was sure, would gladly meet with them and give consideration to what they had to present. Viles made it plain, however, that his association could not discuss price questions under any circumstances as that is one of the functions the trade associations must not take up.

Judging by the statements made by the speakers, who came from all parts of the country, the question of making exclusive tire dealers and automotive dealers compete with department stores, dry goods stores, barber shops and other concerns which carry tires as a side line and cut tire prices to attract trade to the other departments of their businesses will be one of the important subjects discussed when the dealers' committee and the Rubber Association executive committee get together. That method of disposing of tires by makers was criticized.

The national accounts of the tire makers, the direct accounts with fleet owners, the system of discounts, sales of tires to employees and the selling of the same tires to several dealers in the same trading radius were scored by the speakers representing dealers.

Manufacturers came right back and charged that dealers watched their competitors and if they found one prospering in a certain neighborhood they would open a store next door or across the street; that although the leading tire manufacturers of the country had discontinued the mileage guarantee practically every issue of every paper in any city of size contained advertisements of dealers with 6000, 8000 and 12,000 mile guarantees.

F. A. Seiberling of the Seiberling Rubber Co. was optimistic. As costs are lowered and more improved roads are built the tire industry will expand, he said.

Speaking of dealers' problems, Seiberling stated that there are far too many of them in business. He stated there are 50,000 tire dealers: 40,000 selling tires as a side line and possibly 30,000 others. With such a situation existing, the dealers are bound to have trouble.

### Manufacturers Have Problems

The manufacturing end is in the same boat, Seiberling said. A few years ago there were seven tire manufacturers and now there are 300. The speaker said that many in both branches would be eliminated before the business gets down to rock bottom and then would come a healthy period for all. The legitimate tire dealer was pronounced the sound point of contact for the manufacturer, and the argument was made that no business will survive that does not protect the dealer. He declared that tire manufacturers have the same troubles as the dealers, and he urged a spirit of tolerance be shown on both sides. The dealers were urged to build goodwill, for it is a most valuable asset both to them and to the manufacturer.

A. E. Berger of New York City asserted that the distribution of tires in New York was in chaos; that dealers had little confidence in prices and that the situation was further harmed by the action of the United Cigar Stores in selling tubes as a side line. He urged that before opening accounts manufacturers ask applicants for agencies to demonstrate that they had the qualification of good business men.

### AERONAUTICAL BODY TO MEET

NEW YORK, July 5—The annual meeting of the Aeronautical Chamber of Commerce of America, Inc., has been called for July 11 in the executive offices, 501 Fifth Avenue, this city.

## Indiana Pays Honor to Haynes on July 4

### Dedicates Monument on Spot from Which His First Car Was Operated

INDIANAPOLIS, July 5 — Elwood Haynes received the national salute and heard prominent men eulogize him yesterday when Indiana commemorated before the nation his achievement in giving to the country a mechanically successful automobile and dedicated a monument on the spot from which the first Haynes was operated twenty-eight years ago. Hundreds of citizens of Kokomo and the state joined in the observance on Pumpkinvine Pike and listened to the address of Dr. G. L. MacIntosh, president of Wabash College, and other speeches.

As the monument of granite with an inscription in stellite, another invention of Haynes, was unveiled by Mrs. John Edward Moore, past president of the Indiana Federation of Women's Clubs, the guns of Battery A 150th Field Artillery boomed the national salute in honor of Haynes and his first little machine, which the Smithsonian Institution had loaned for ceremonies.

On behalf of the Indiana Historical Commission, Frank B. Wynn paid tribute to Haynes' achievement, as did Frederick W. Fenn, representing the National Automobile Chamber of Commerce, who brought the greetings of the chamber. Mayor B. C. Moon of Kokomo made the address of welcome. Governor McCray of Indiana, represented by C. C. Shirley, who declared the celebration commemorated an epochal event in the development of the automobile and modern transportation.

### Haynes Responds to Tribute

Haynes responded to the tribute and stated that at the original try-out there had been just four people. He narrated how the car had been hauled to the starting point, where a marker now stands, and had run a mile down the Pike turned around and ran back to the starting point. In his tribute to the citizens of Kokomo, he said I am surprised that that they stood for the annoyance that this machine caused them.

Wilbur D. Nesbit of Chicago was chairman of the occasion.

### M. A. M. A. TO MEET AT BUFFALO

NEW YORK, July 5—The annual fall convention of the Motor and Accessory Manufacturers Association, at which credit and other conditions will be discussed, will be held at the Lafayette Hotel, Buffalo, Sept. 13, 14 and 15.

## Factories in Toledo Add More Workers

### Vehicle Plants Lead With Scarcity of Skilled Workers a Problem

TOLEDO, July 5—The automotive industries at Toledo contributed largely to the big increase in employment reported to the Department of Labor for the month ending June 30. C. G. Hale of the Merchants and Manufacturers Association reported for the twenty-one plants which normally employ 500 or more workers, that the gain for the month was 3913 employees, which is a greater increase than in any month for two years. The total in the twenty-one plants now at work is 24,706 employees.

The vehicle plants showed the greatest gain with 2672 men added. The Willys-Overland Co. now has 10,825 at work, which is an increase of 2200 as compared with the end of May.

The Milburn Wagon Co. put on 82 more men; the Toledo Chevrolet plant increased its force by 350 men, and the Toledo Machine & Tool Co., which is making automotive equipment for the most part, put on 120 more men.

The Electric Auto-Lite Co., which is classed in the miscellaneous group, showed a gain of 584 workers in the month. A night force has been added at that plant. The Champion Spark Plug Co. added 59 workers.

In some of the larger plants the labor turnover and the scarcity of skilled mechanics has now become a problem.

Willys-Overland officials report that sales are holding up to such a point that production is being increased right along. The daily turnout is nearing the 900 mark now. Most dealers report a heavy demand for closed cars.

### Nash Reports Business Is Improving in West

KENOSHA, WIS., June 30—One hundred and fifty Nash sixes are being manufactured daily at the factory here and 60 fours a day at the Milwaukee plant. Orders received indicate that the present schedule will be continued during July and August. President Charles W. Nash does not look for as much business during July and August as last year, when several price reductions that were delayed until July 1 held up a great deal of buying which made July and August the largest production months of 1921. He expects a falling off of 10 to 15 per cent during these months, which would make them parallel the summer months of previous years, 1921 excepted.

Business is improving west of the Mississippi, C. B. Voorhis, vice-president in charge of distribution, reporting increased business from Kansas City and Salt Lake City, so that these two centers are now included among the ten centers that have in the last week shown the largest increase in retail sales.

This is the first time these cities have been included in the leading centers, as it is the first time that cities west of the Mississippi have qualified in such a list. It is a good indication of the business stimulation that is hoped to come because of the harvest and gives evidence that the farmer is going to re-enter the buying market. Montana has recently come back into the field, doubtless due to the very considerable improvement in conditions there.

### Durant May Name Sarver to Operate Locomobile

NEW YORK, July 5—If the offer of Durant Motors, Inc., for the plant and assets of the Locomobile Co. is accepted when they are offered at receiver's sale, it is probable that the subsidiary corporation which will be organized to operate the property will be headed by A. H. Sarver, who headed the Scripps-Booth Corp. until it was dissolved by General Motors. It is not likely that Sarver will be actually in charge of production, but this work will be entrusted to some man already in the Durant organization.

Durant is understood to be willing to pay about \$2,000,000 for the plant which includes four large buildings and eight or ten smaller ones. It is his purpose to effect manufacturing economies which will permit the sale of the Locomobile for less than half the present price and put it in the class with Cadillac and Lincoln. He proposes to use part of the factory space for the manufacture of the new Mason truck to supply the Eastern territory.

### Mason Completes Test Run of New "Road King"

FLINT, MICH., July 5—The Mason Motor Truck Co. has completed a test run to New York and return with an experimental model of its one-ton "road king" truck which covered the distance of 1949 miles without a single mechanical repair. When the truck reached New York it was accepted by W. C. Durant without change.

Durant declared it was the first experimental job he ever saw which was accepted without change after its maiden trip.

The truck averaged 15.5 miles per gallon of gasoline for the entire distance.

Production of the one-ton model will begin at once. Experimental work has been started on a two-ton model which will be produced in about 90 days.

### FARMERS BUY OVERLANDS

TOLEDO, July 5—Analysis of sales by the Willys-Overland Co. for May shows that farmers bought 81 per cent more Overland cars in that month than any other vocation. Laborers came next, with approximately 10 per cent of the total output. Merchants, salesmen, clerks, foremen and doctors followed in the order named. The vocational list of Willys-Knight owners show 104 classifications for May with the farmer fifth.

## Most A. E. F. Trucks in Germany Are Sold

### None of the 2,000 Machines Used During Occupancy Will Be Returned

WASHINGTON, July 1—All motor trucks used by the American Expeditionary Forces in Germany, with the exception of thirty, have been sold, the Department of State has been advised by General Henry E. Allen, Commander of the Rhine forces.

The information that none of the 2000 or more trucks used by the Government during the occupancy of German territory will be returned to this country, was received in response to a cable request by the Department to ascertain what number, if any, of the trucks might be affected by the Graham anti-dumping bill.

The trucks, it is understood, were sold with the understanding that none of them were to be re-imported to the United States. If the Graham anti-dumping bill is passed, a duty of 90 per cent re-import duty on the returned trucks would be collected.

The Department was not advised what price the trucks brought, but the cable advises that they were sold to all comers on open bids for whatever they would bring. The announcement of the truck sales has brought a protest against the Department of War by the Agricultural Department, which had previously been promised the equipment.

### Cole Motor Operating 85 Per Cent Capacity

INDIANAPOLIS, July 5—Production of the Cole Motor Car Co. is running 100 per cent ahead of last year and at a rate which is equal to 85 per cent of capacity. J. J. Cole, president and general manager, reports that the smaller dealers in agricultural districts are ordering cars for delivery during the summer months and that with the harvesting of crops business with them will be better than in the last two years. Foreign business also has improved materially.

A balance sheet of the Cole company as of May 1 showed current assets of \$3,561,629 as compared with current liabilities of only \$327,671. Cash on hand amounted to \$699,089. The Cole company paid a 10 per cent dividend early in May and present indications are that there will be a similar distribution of profits in October.

### NEW STEAM CAR TO APPEAR

CHICAGO, July 3—The American Steam Truck Co., which is producing a steam passenger car, announces that it will show the car publicly for the first time at the Chicago Pageant of Progress which will open on the Municipal Pier Aug. 29. A carload of complete phaeton bodies has been received at the factory.



## Dutch May Restrict Rubber Production

### Association of Growers Acts Against Piling Up Surplus of Crude

NEW YORK, July 3—A cable dispatch from The Hague says:

"Action likely to have a far-reaching effect upon the world's rubber industry has been taken by the International Association of Dutch Rubber Growers at a conference held here. The urgent necessity for application of a remedy for the deplorable condition into which the industry has been forced by over production in years of financial and industrial depression, following the war, finally induced the growers in the Netherlands East Indies to seek government help to end it.

#### Seek to Meet Opposition

It then goes on to say:—

British producers, or a majority of them, have long urged the necessity for enforced regulation of the output of crude rubber through government agencies; since efforts to procure a voluntary restriction failed through lack of good faith on the part of many of the growers. It has been realized that without the cooperation of the Netherlands East Indies, any action taken by the British Colonial Government would be of little effect.

For many months efforts have been made to overcome the strong opposition of Dutch growers to government interference with rubber production, and the action now taken through their representative organization in seeking the assistance of the Netherlands Government for the rehabilitation of the industry will go a long way toward producing the desired result, if it does not remove all obstacles.

At the conference the association adopted by a vote of 383 against 129 a decision favoring government restriction of the output and a committee was appointed to take up the matter with the Netherlands Government. This does not mean that the proposals of the British States Commission have been fully accepted, but only that the Dutch Government will be asked to cooperate with other governments in order to obtain government regulation.

It was also agreed by the conference that there be taken under consideration the proposal made by the Dutch press, that an organization be formed for the purpose of withholding from the market 100,000 tons of the surplus rubber in the hands of merchants and producers.

### Nine Companies Merged as Associated Motors

(Continued from page 44)

economical methods of operation. Present plans include automobile assembly plants at Boston, Indianapolis, Louisville, St. Louis and Oakland, Cal. The company has no plant at Oakland, but is understood to be negotiating for one.

Plans include a subsidiary dealers' financing organization capitalized at \$35,000,000. This plan will permit the dealer to sell cars and trucks on a small

cash payment from which he will take his discount or commission and to accept for the balance notes which he will turn over to the finance corporation. Between 600 and 700 banks have agreed to buy these notes from the finance company, Ohmer said.

As to the parts manufacturers, Ohmer said the new corporation will use nearly the entire output of the various plants, but that any surplus would be disposed of at inside cost to other manufacturers.

In addition to the officers, members of the board of directors are as follows:

James R. Duffin, president, Inter-Southern Life Insurance Co., Louisville, Ky.; H. G. Stoddard, treasurer, Wyman-Gordon Co., Worcester, Mass.; H. V. Hale, general manager, Saginaw Sheet Metal Works; H. J. Linkert, treasurer, the Recording & Computing Machines Co.; C. L. Halladay, vice-president and general manager, Jackson Motors Corp.; W. W. Sterling, vice-president, Jackson Motors Corp.; C. L. V. Exselsens, vice-president and treasurer, Roland A. Crandall & Co., bankers, Chicago; Guy Wilson, president, Traffic Motor Truck Corp.; Buell Hollister, Pyne, Kendall & Hollister, bankers, New York City; H. F. Holbrook, president, H. F. Holbrook, Inc.; M. Douglas Flattery, chairman of board of Murray-Tregurtha Corp.

#### Industrial Motors Directorate

NEW YORK, July 6—Industrial Motors Corp., a consolidation of the Selden Truck Co. of Rochester and the Atlas Truck Co. of York, Pa., a subsidiary of the Martin Parry Corp., has announced the personnel of its board of directors for the present. The board is as follows:

John J. Watson, Jr., president, Lee Rubber & Tire Corp., chairman of the board, Martin-Parry Corp., and vice-president and treasurer of the International Agricultural Corp.; Frederick M. Small, president, Martin-Parry Corp.; Reeve Schley, vice-president, Chase National Bank; George C. Gordon, president, Selden Truck Corp.; Robert H. Salmons, vice-president, Selden Truck Corp.; William A. Phillips, New York; George P. Smith, member of the firm of Smith & Gallatin; Oscar L. Gubelman, member of the firm of Knauth, Nachod & Kuhne, and Henry Hopkins, Jr., a member of the law firm of Travis, Spence & Hopkins.

### Moller Buys Crawford; Will Add Sport Model

HAGERSTOWN, MD., July 5—The stock of the Crawford Automobile Co. of this city has been purchased by M. P. Moller, a wealthy pipe organ manufacturer, and the plant has been placed under the supervision of Herbert N. Ross of New York. The factory was owned for several years by a corporation in which Moller and Henry Holzappel, Jr., of this city were the principal stockholders. This corporation, it is said, will be dissolved.

Announcement is made by Moller and Ross that in addition to the Crawford car a sport model, to be called the Dagmar, will be manufactured at the local plant. One of its sport models has been built and is on exhibition in the company's salesrooms in New York.

## Senate Seeks Data on Gasoline Prices

### To Get Information on Inter-corporate Relations and Stock Ownership

WASHINGTON, July 5—Investigation into the oil industry authorized by a Senate resolution will be made a sweeping inquiry into all conditions of the trade. The inquiry is under the direction of Senator LaFollette, chairman of the Committee on Manufactures, who, it was said to-day, hopes to develop a situation that will bring about legal action and a lowering of gasoline prices.

As a preliminary step to the investigation, Senator LaFollette to-day sent questionnaires asking the producers and the dealers many important questions bearing upon the conditions of the crude oil and gasoline markets during the years 1920, 1921 and the first six months of 1922, as well as the reason for the changes in prices of oil and gasoline. Other questions asked cover organization and business and financial conditions.

In this connection, Senator LaFollette said:

#### Latest Information Sought

These schedules are framed with the view of getting from the companies the latest and most complete information on the subject covered by the resolution. The purpose of the schedule on prices is to determine the prices paid by refineries for the crude oil or raw material and the prices revised by them for the finished products resulting therefrom after the refinery operations. Its purpose is also to bring out the tank wagon prices of gasoline and kerosene and the differentials existing between said prices and the retail or service station prices.

The schedule on organization and business is intended to develop the intercorporate relations, if any, existing between the various companies engaged in the oil business; also to develop any common stock ownership that might exist together with any strong connection existing by virtue of any financial relationship.

The financial schedule is intended to develop the financial condition of the companies in the various branches of the oil business during the period mentioned, also to bring out the profits made in the industry during this period.

These questionnaires were sent to something over 350 companies, covering all the large refineries and producing companies and the principal marketing companies. The questionnaires were accompanied by a copy of the resolution and a letter of explanation, so that the companies might be fully informed respecting the scope and purpose of the investigation.

#### CORRECTION

In the June 14 issue of AUTOMOTIVE INDUSTRIES it was stated that the Wilson Foundry & Machine Co. was preparing to produce 300,000 Willys-Knight engines next year. This obvious error was the result of attaching one too many ciphers to the figures. It should have read 30,000.

## FINANCIAL NOTES

**Torbensen Axle Co.** on July 15 will redeem the scrip issued to holders of the old preferred stock at the time of the recent organization. When the company was reorganized there were two unpaid accrued dividends upon the preferred stock amounting to \$3.50 a share. In the reorganization preferred stockholders were offered for each share of preferred stock four shares of the new no par common and scrip representing \$3.50 in unpaid accrued dividends. This scrip was to be redeemed before any dividends could be paid upon the new common stock. The position of the old preferred shareholders after the scrip has been redeemed will be as follows: They will have received dividends accrued on their preferred stock and in place of each one share of preferred stock which, if purchased at the time of the original offering cost them \$96 a share, they will be in possession of four shares of the new no par common, which at present quotation of from \$26 to \$27 a share, represents a total market value of from \$104 to \$108, or \$8 to \$12 more than the original cost of the preferred stock.

**B. F. Goodrich Co.** stockholders will meet on July 24 to authorize the redemption of \$30,000,000 5-year 7 per cent gold notes on Oct. 1, 1922. In order to provide in part for funds to retire notes, stockholders will be asked to provide an authorized issue of \$25,000,000 first mortgage 25-year 6½ per cent gold bonds, \$20,000,000 of which are to be issued at once. The balance of the funds to retire the 7 per cent notes will be provided by the company in the regular course of business. The issue is being offered at 97 and interest by a syndicate composed of the Bankers Trust Co., Guaranty Co. of New York and Goldman, Sachs & Co.

**Durant Motors of Canada** for the two months ended April 30 shows total revenue from the sale of cars and parts with receipts from other operations of \$652,944. The total receipts, including earnings and receipts from stock sales during the period, amounted to \$2,104,778. Disbursements, including land and buildings, were \$45,011; machinery and equipment, \$149,762; expenses of organization, \$261,597; materials and supplies, \$596,543; labor, power, etc., \$306,817. Cash on hand April 30 aggregated \$741,783.

**Republic Rubber Corp.** reports that on a gross volume of business of \$556,000 in May the earnings were \$9,699. An authorized issue of \$1,500,000 certificates of indebtedness has been sold. Proceeds are being employed to retire certificates previously issued, aggregating \$1,000,000 and to aid in expanding its operations. June business is reported as running at the same average rate as in May.

**Daniels Motor Co.** has declared the regular quarterly dividend of 2 per cent on its preferred stock. President George E. Daniels states that sales were increasing and that with the new machinery recently obtained the company's output would be materially enlarged and operating costs reduced.

**Webster Electric Co.,** Racine, Wis., maker of ignition devices, motor-driven tools, grinders, etc., has recently changed its authorized capitalization to consist of \$125,000 of 7 per cent cumulative preferred stock at \$100 per share, plus 10,000 shares of common stock having no par value.

**Commonwealth Finance Corp.** has declared a dividend of 10 per cent on the common stock, payable in stock, and the regular semi-annual dividend of \$3.50 a share on the

preferred stock both payable July 15 to stock of record June 30.

**Mason Tire & Rubber Co.** has resumed cash dividends on preferred stock, having declared a quarterly disbursement of 1¼ per cent, payable July 1 to stock of record June 25. The previous payment was made in scrip.

**Master Tire & Rubber Co.'s** assets will be disposed of at receiver's sale on July 26 at the plant in Dayton, Ohio. The appraised value of the fixed assets in September, 1921, was \$225,000. Robert E. Cowden is receiver.

**American Rubber & Tire Co.** has declared a dividend at the rate of 8 per cent on outstanding preferred stock of the company for the quarter ending June 30, payable July 1.

**Lee Rubber & Tire Corp.** announces that its profits for the first four months of 1922, after setting aside special reserves, were \$177,000, equal to \$1.18 a share.

**Jordan Motor Car Co.** reports that June earnings will approximate twice the preferred dividend requirements for the year.

**Reo Motor Car Co.** has declared a stock dividend of 100 per cent, payable Aug. 10 to stock of record July 15.

## Anti-Knock Liquid Production Planned

NEW YORK, July 5—Commercial production by the General Motors Research Corp. of tetra ethyl lead, the anti-knock liquid which has been developed in its laboratories, probably will not be started for several months. It first will be necessary to provide a plant, which probably will be located where there is an abundance of water power. The liquid is produced by a process of distillation and it is highly explosive, which will make it necessary to locate the plant with care.

When commercial production is begun, the liquid will be supplied first to the Government for use in aircraft. The second customer to be taken care of probably will be the Fifth Avenue Coach Co. and the third, a Chicago taxicab company.

## Standard Is Producing New Light Speed Truck

DETROIT, July 3—A new model 75 light delivery speed truck is being manufactured by the Standard Motor Truck Co. to sell for \$1,330. It has a capacity of 1¼ tons exclusive of the body allowance and has 35 x 5 pneumatic cord tires. Drive is by worm type Timken axle. Practically the same line of units is used in this truck as is used in the heavier models. These include a Continental 3¼ x 5 engine, Brown-Lipe disk clutch, Timken axle and Ross steering gear. The wheelbase is 134 in.

## BETHLEHEM OPERATING

PHILADELPHIA, July 6—The newly reorganized Bethlehem Motors Corp. has begun operations at Pottstown and Allentown under Howard B. Hall of New York, who is acting for the stockholders' syndicate. The plant is running 10 hours daily. The officials are optimistic in their outlook of the motor truck business and soon will add to the working force at the plant.

## BANK CREDITS

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

Outside of preparations for the July 1 interest and dividend payments there were no important developments in the money market last week. Call money ruled firmer, covering a range of 4 per cent to 5½ per cent as compared with 2¾ per cent to 5 per cent in the previous week. There was a better demand for time money and a somewhat firmer tone developed. Sixty and ninety days' and four months' maturities were quoted at 4 per cent to 4¼ per cent, and five and six months' at 4¼ per cent as against a rate of 4 per cent for sixty days' maturities and a range of 4 per cent to 4¼ per cent for the longer maturities in the previous week. The prime commercial rate remained unchanged at 4 per cent.

The Federal Reserve statement as of June 30, 1922, showed an increase of \$908,000 in gold reserves and \$691,000 in total reserves. Total bills on hand increased \$80,126,000 and total earning assets \$81,199,000. Total deposits increased \$84,877,000, while Federal Reserve notes in circulation showed a decline of \$1,882,000. The reserve ratio declined from 79.1 per cent to 77.5 per cent.

Car loadings for the week ended June 17 were reported at 866,772, which is the year's peak and marks a 2.9 per cent increase over the number reported for the week ended June 10 and an increase of about 11.2 per cent over the week ended June 17, 1921, when car loadings were reported at 775,328.

Business failures for the week ended June 29 amounted to 382 as compared with 390 in the previous week; 303 for the week ended June 29, 1921; 122 for the corresponding week in 1920; 92 for 1919 and 108 for 1918.

The production of steel ingots during the half year just ended aggregated about 16,000,000 gross tons, as against 9,000,000 tons in the second half of last year and 10,000,000 in the first half of 1921. It is expected in some quarters that there will be a further increase in production during the next half year in order to maintain a balance in the market, inasmuch as the present rate of ingot production is about 40,000,000 tons a year.

## MOON EXCEEDING MAY

ST. LOUIS, July 3—With orders on hand to keep the factory running at capacity for two months, the Moon Motor Car Co. reports its June business approximately 20 per cent better than that for May, which was the company's best month by 64 per cent up to that time.

The company expects good business this fall in the farming communities. One of its Nebraska dealers recently reported that many orders were given in Nebraska and Iowa conditioned upon rain before July 1. The rain came, breaking a threatened drought, and greatly improving crop prospects.



## INDUSTRIAL NOTES

**Fryac Manufacturing Co.**, Rockford, Ill., manufacturer of spark plugs, states that sales during the first six months of 1922 have surpassed the total year's business in 1921. This increase, President A. F. Hogland states, is due largely to the certificate plan the company has been employing. This certificate is good for \$1 on the purchase of a set of Fryac plugs for any engine.

**Simmons Handin Motor Co.** of Chicago has been appointed distributor of Gray cars for northern Illinois. Simmons is one of Chicago's oldest dealers and Handin for some time handled retail sales for Ford Motor Co. in that city. He was later made branch manager of the Salt Lake City and Cincinnati plants of that company.

**Milwaukee Concrete Mixer Co.**, Milwaukee, has brought out a new design of portable concrete mixer under the name of "Mixer-mobile." The mixer unit is mounted on a standard Ford 1-ton truck chassis and embodies all the features of the old style concrete mixer with added speed and mobility.

**Fisher Body Corp.**, Detroit, enters the third quarter with a record volume of business booked up. The output during July and August will be at capacity. With the continuance of the growing demand for closed bodies the corporation probably will run at capacity throughout the year.

**Erlsson Manufacturing Co.**'s site and building at Buffalo are being advertised for disposal in accordance with a court order through a receiver's sale on July 25. The company manufactures Berling magnetos. The receivers are W. A. McDougal and R. E. Powers of Buffalo.

**Stromberg Carburetor Co.** increased its directorate from seven to eight members by the election of Harland B. Tibbetts. The retiring directors were re-elected. William L. O'Neill was chosen vice-president.

**Packard Engineering Co.** announces the removal of its offices to a permanent location at 1200 West 76th Street, Cleveland.

**American Motor Body Co.** reports that it has received an order from Durant Motors, Inc., for 50,000 car bodies.

## Stephens Will Produce 650 Cars During July

**FREEPORT, ILL.**, July 3—Twenty-five cars a day are being produced by the Stephens Motor Car Co. The July output will approximate 650 cars, as compared with 425 for June and 430 for May. There are orders on hand to maintain this capacity during July and August.

The brush design of engine used in the Stephens has for the last two months been manufactured by the Stephens company at its plant in Moline, where a modern brick factory is utilized, the present daily production being 30 engines. At the two Freeport factories 520 men are employed, all of the open, and closed bodies being done here, as well as the chassis assembly and all sheet metal work. These factories have a capacity for 75 complete vehicles a day.

The Stephens company is completing its final run of 1800 commercial bodies for Fords, the manufacture of which line has been carried on for several years.

The intention, according to General Manager H. J. Leonard, will be to confine all manufacturing effort to Stephens cars.

The present Stephens output is 10 per cent closed types. The bodies are produced completely in these factories, the plant having very complete woodworking mill, forge shop, sheet metal, upholstery, top and painting departments.

## A. A. A. to Investigate Local Club Sentiment

**NEW YORK**, July 5—The executive board of the American Automobile Association decided at a meeting here that the Ohio State Automobile Association was not functioning properly and admitted the Cincinnati Automobile Club to direct membership. A vote of appreciation was extended to the Youngstown club for its loyalty in refusing to join the state association in leaving the A. A. A. President Diehl announced that the Cincinnati and Youngstown clubs would be made the nucleus for a new state association.

The board announced that the Illinois association had been expelled from membership because of protesting checks and stopping payment on a recent check sent in payment of dues.

A committee consisting of David Jameson, Robert Hopper and Laurens Enos was appointed to investigate the sentiment of local clubs in all state associations which have withdrawn from the A. A. A. No action was taken in regard to the appointment of a permanent executive secretary.

## Samson Tractor Output Stays at High Level

**JANESVILLE, WIS.**, July 5—Despite the fact that the spring rush is over, the Samson Tractor Co. is keeping operations of its main works here at the same point as for the past 60 to 90 days, when a schedule of 25 to 35 tractors a day was necessary to meet orders. New business is being booked in a quantity sufficient to absorb output.

The Samson farm truck also is being produced in quantity on a schedule heavier than ever reached heretofore. One of the latest developments of the tractor department is mounting fire pumps on the chassis, the unit being designed for fire departments in the smaller communities.

## FRANCE PLANS ROAD PROGRAM

**PARIS**, June 25 (By Mail)—A program of road building on a large scale in France is outlined in the new budget of the French Ministry of Public Works. The old system of French roads includes about 28,000 miles of highways and much repair work is needed. Increased strain on the French highways has been caused by a larger use of motor traction.

The number of automobile tractors and lorries in operation increased from 8000 in 1913 to 93,000 in 1921. The total number of motor vehicles increased from 100,000 to 208,000 in the above period.

## METAL MARKETS

**A** PERFECTLY normal pause in the buying of steel products for August shipment by automotive consumers has set in. Nothing could be more natural amid the unsettled transportation conditions of the last few days and the general holiday atmosphere that was in evidence during the week. It is significant, however, that steel producers are more or less perturbed by this recession in the automotive buying wave. What fresh buying emanates from the automotive industries is nearly all for immediate shipment, and order books for mills for August shipment are not filling as rapidly as producers would wish. There are those among the producers who interpret the slowing up in buying for forward delivery as a temporary lull, while others have concluded with resignation that the pace of automotive steel demand during the third quarter will be less spirited than it was during the second quarter.

Taking the position of the steel industry as a whole, it remains an open question so far whether much or little of the 16,000,000 tons ingot production during the first half of the year must be attributed to apprehension on the part of buyers lest the coal strike result in a steel shortage.

In order to consider the steel production of the first half of the present year as having been actually consumed, it is necessary to assume an increase in the demand of 33 1/3 per cent over that of the first half of 1921. There are many who doubt that so marked an improvement has actually taken place, and these incline to the view that considerable steel was shipped by mills during the last few months that awaits actual consumption. It is admitted, however, that the automotive industries form a notable exception from the general run of steel consumers, and that the tonnage of steel held in reserve by automotive consumers is of negligible proportions. Automotive consumers have bought from hand-to-mouth right along, and it is this factor which causes many producers that specialize in automotive steels to look upon the present let-up in buying for forward delivery as merely temporary.

**Pig Iron.**—Blast furnaces are bending every effort to hurry forward shipments of foundry and malleable iron ordered sent forward following the reduction in freight rates, which went into effect last Saturday. Fresh buying by foundries is temporarily in abeyance.

**Steel.**—Shortage of suitable labor is beginning to hamper more or less seriously operations of mills in all parts of the country. Merchant steel bars are in tight supply and in consequence cold-drawn steel bar producers are experiencing difficulty in fulfilling their obligations. New business is either turned down or an advance of \$2 per ton over the previously prevailing 2c. base price asked. Sheet bars also continue scarce. One producer of full-finished sheets is asking \$7 per ton more for No. 22 gage than the American Sheet & Tin Plate Co.'s official contract price. Hot-rolled strip producers are running short of fuel and restricting commitments.

**Aluminum.**—The market continues unchanged and apparently entirely unaffected by the Washington report of acceptance of the proposed metal tariff schedule in the Senate.

**Copper.**—Consumers are buying slowly and, while the market is fairly steady, it seems difficult to lift it to the 14c. level.

# Calendar

## SHOWS

Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Nov. 13-18—Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

January—Chicago, Annual Automobile Salon.

## FOREIGN SHOWS

March 10-July 31—Tokio, Japan, Peace Exhibition.

July 1-24—London (Olympia), Aircraft Exhibition.

Sept. 1922—Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brasileira.

Sept. 15-20—The Hague, Automobile Show.

Sept. 25-Oct. 3—Berlin, Automobile Show at the Kaiser-Damm Hall under the auspices of the German Automobile Manufacturers Association.

September—Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15—Paris, Automobile Show, Grand Palais.

Nov. 3-11—London (Olympia), Automobile Show.

Nov. 10-Dec. 19—Brussels, Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

## RACES

July 15—Strasbourg, French Grand Prix.

## CONVENTIONS

July 17—Baltimore, meeting, representatives of highway departments of ten Eastern states.

June 26-July 1—Atlantic City, Twenty-fifth Annual Meeting of the American Society for Testing Materials, Chalfonte-Haddon Hall Hotel.

August 23-Sept. 2—Detroit National Safety Congress.

Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

## Small Cars Gaining in Use in Antipodes

NEW YORK, July 5—Fiat is first and Citroen second in the sale of continental European cars in Australia and New Zealand, in the opinion of L. B. Clarkson of the firm of J. B. Clarkson & Co., Ltd., Sydney, Australia. British car makers are doing very little business in Australia or New Zealand. Small cars continue to gain in use in the antipodes, partly owing to the high cost of fuel and tires resulting from local manufacturing and the tariff in Australia. To these can be added the high body costs.

Australia has its stock of cars largely liquidated, but there are still stocks on hand in New Zealand. Exports from New Zealand have not developed as hoped for and this has hindered domestic business proportionately.

### Motor Truck Business Good

Motor truck business is thriving in Sydney, and the prospects for a relatively large increase in motor bus business are good. The narrow streets of the city have brought about the building of a subway that should be completed in two years. The people are also demanding motor bus service, a service that is greatly restricted due to the refusal of the street railway companies to permit bus lines to parallel railway routes. The motor truck business has not opened up much in any other part of Australia.

American tire makers have little chance in Australia, according to Clarkson, as the import duty of approximately 50 cents a lb. on pneumatic tires protects the three home manufacturers, of which Dunlop is the largest. It is possible to buy Dunlop tires manufactured in Australia cheaper in New Zealand than in Melbourne as a high protective tariff is not in force in New Zealand.

The Australian body building industry is well handled, and a good four or five-passenger body can be had for \$310 to \$360 in quantities. The duty of \$60 Sterling per body on a four or five-passenger

car is somewhat of a barrier, except in the higher price class of cars, as the duty is a flat one, the same for a Ford as for a Lincoln.

Australia still has labor difficulties. New South Wales voted the labor party out of office some months ago, and Queensland is the only remaining province of the Commonwealth that has labor government, and this government is expected to be overthrown within the next six or seven months.

Readjustment of war wages is not yet underway.

### LAUSON PRICES LOWERED

NEW HOLSTEIN, WIS., July 3—The John Lauson Manufacturing Co. has made the following reductions in the prices of its tractor models:

	Old Price	New Price
Model 5.....	\$1,495	\$1,295
Model 21.....	1,875	1,675
Road Model.....	2,100	2,000

### HUDSON-ESSEX REDUCED

DETROIT, July 1—Reductions of \$50 each were made to-day by the Hudson Motor Car Co. on four models of Hudson and Essex. Hudson four-passenger phaeton was reduced to \$1,645, the touring to \$1,695, and the coach to \$1,745. The Essex coach was reduced to \$1,295. The cabriolet has been reduced \$100, to \$1,195.

### JEANNETTE TIRE LOWERED

JEANNETTE, PA., July 6—The Pennsylvania Rubber Co. of America, Inc., announces a price reduction on all sizes of its vacuum cup, cord and fabric tires and "ton tested" tubes, effective July 6. The new schedule shows the following reductions:

Vacuum Cup Tires		
	Old Price	New Price
30 x 3½ .....	\$13.95	\$11.95
30 x 4 (Cord).....	32.50	29.25
Tubes		
	Old Price	New Price
30 x 3½ .....	\$2.35	\$1.95
32 x 4 .....	3.25	3.05

## Light Bus Continues Multiplying in Peru

LIMA, PERU, June 6 (By Mail)—The light passenger buses have continued multiplying in Lima. In fact the motor buses have grown more rapidly than the streets have been improved, and consequently are congested in a comparatively narrow area.

It is worthy of note that the light motor passenger buses of North American manufacture are still in service in Lima and increasing in number, yet the large European buses (De Dion Bouton) are out of commission.

For some time in Lima automobile dealers have been moving out of the central, crowded section of the city to the slowly developing wholesale district. This marks the second stage in the automotive evolution of Peru.

### No Saturation Point

The population of Peru is variously estimated at about 5,000,000. Of these not 1,000,000 are to be considered economically. The importations per capita for Peru a few years ago were \$13.78, but as only one-fifth of the entire population are economic consumers, this makes the importation per capita \$68.90. There are countries with a per capita importation of \$68.90 that have 10,000 automobiles. If road construction should be pushed in Peru, the estimate might be hazarded that the saturation point would not be reached before there were in the country 10,000 automobiles and trucks. This would mean that 1 per cent only of the economic consumers of Peru would have an automotive vehicle.

### INJUNCTION FOR TORBENSON

NEW YORK, July 6—A permanent injunction was granted the Torbenson Axle Co. to-day by Justice Knox in the United States District Court restraining the United Gear Manufacturers Corp. from using the Torbenson name in the selling of parts for Torbenson axles where these parts are not made by the Torbenson company.